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OIL POLLUTION REPORTS (formerly OIL SPILL AND OIL POLLUTION REPORTS) is a quarterly compilation of abstracts of current oil pollution related literature, research projects, and conferences. Comprehensive coverage of terrestrial and aquatic oil pollution and its prevention and control is provided, with emphasis on the marine environment. The report contains (a) citations and summaries of 1976 to 1978 scientific and technical publications, and patents; (b) status and summaries of current research programs; and (c) information on current meetings. This report is submitted in partial fulfillment of EPA Grant No. R-805803-01-0 by the Marine Science Institute, University of California, Santa Barbara, under the sponsorship of the U.S. Environmental Protection Agency.

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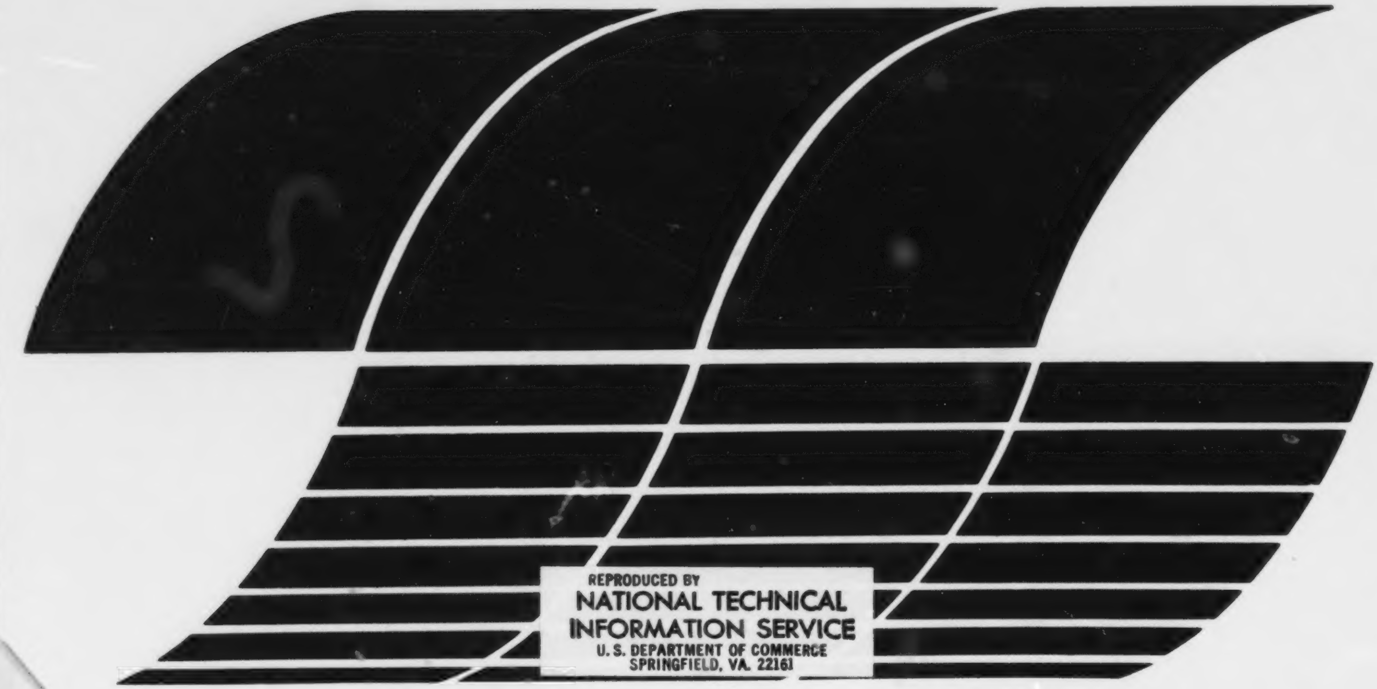

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2. Environmental Protection Technology
3. Ecological Research
4. Environmental Monitoring
5. Socioeconomic Environmental Studies
6. Scientific and Technical Assessment Reports (STAR)
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8. "Special" Reports
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EPA-600/7-79-040
February 1979

OIL POLLUTION REPORTS
Volume 5, Number 4
(October 1978 - December 1978)

by

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FOREWORD

When energy and material resources are extracted, processed, converted, and used, the related pollutional impacts on our environment and even on our health often require that new and increasingly more efficient pollution control methods be used. The Industrial Environmental Research Laboratory - Cincinnati (IERL-Ci) assists in developing and demonstrating new and improved methodologies that will meet these needs both efficiently and economically.

This report is a product of the above efforts. It cites current events, literature, research, patents, and other materials relevant to the oil pollution abatement program and is published in an abstract format on a quarterly basis. As such, it serves as a basic reference document for all those interested in oil spill and oil pollution control. This project is part of the continuing program of the Oil and Hazardous Materials Spills Branch, IERL-Ci, to assess and mitigate the environmental impact of oil pollution.

David G. Stephan
Director
Industrial Environmental Research Laboratory
Cincinnati

ABSTRACT

OIL POLLUTION REPORTS (formerly entitled OIL SPILL AND OIL POLLUTION REPORTS) is a quarterly compilation of abstracts of current oil pollution related literature, research projects, and meetings. Comprehensive coverage of terrestrial and aquatic oil pollution and its prevention and control is provided, with emphasis on the marine environment. The report contains (a) citations and summaries of 1976 to 1978 scientific and technical publications, and patents; (b) status and summaries of current research programs; and (c) information on current oil pollution related meetings. This report is submitted in partial fulfillment of EPA Grant No. R-805803-01-0 by the Marine Science Institute, University of California, Santa Barbara, under the sponsorship of the US Environmental Protection Agency.

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ACKNOWLEDGEMENTS

The authors wish to thank the personnel of the Marine Science Institute, the Science Engineering Library, and the Interlibrary Loans office at the University of California, Santa Barbara, for their assistance during the research stages of this project.

INTRODUCTION

OIL POLLUTION REPORTS (formerly OIL SPILL AND OIL POLLUTION REPORTS) is a quarterly bulletin which reviews pertinent scientific and technical publications, research projects, and meetings, to provide its readers with current developments in the field of oil pollution. This issue contains summaries of articles, reports, patents, and other literature relating to oil pollution published since 1976 (Section I); summaries and status of current research projects (Section II); and current oil pollution related conferences (Section III). This document series is now identified by volume and issue number; issues prior to 1978 were identified by quarterly dates alone, as shown on the following page.

Subject coverage includes aquatic and terrestrial oil pollution with emphasis on the marine environment. Items in Section I are categorized by eight major subdivisions which are divided into thirty-seven specific subject categories. A list of the periodicals reviewed in preparing this series appears in Appendix A.

Section II presents titles of active or recently completed oil pollution research projects, summaries of project objectives, and current status information and/or resulting publications provided upon request by the principal investigators or performing organization. Notices of research projects are obtained primarily from the Smithsonian Science Information Exchange (SSIE). Entries are arranged according to the same subject categories as in Section I. Some of the projects listed in previous OIL POLLUTION REPORTS have been recently renewed. Those projects have been relisted with a current serial number, followed by the original number in parentheses.

Entries in Section I and II have separate serial numbers. The letters preceding the serial numbers designate the following: C, reports, publications, and patents; and R, research projects. Keyword, author, and patent indexes are provided at the end of the report.

Section III, Current Conferences, contains descriptive information on recently held and upcoming meetings relevant to any aspect of oil pollution. Conference dates are listed; and, when information is available, titles, authors, and abstracts of oil pollution related papers are included. All information for this section was obtained from the periodicals reviewed (Appendix A) and from responses to written inquiries concerning the meetings.

OIL POLLUTION REPORTS
(Oil Spill and Oil Pollution Reports, 1974 to Vol. 5 No. 1)

Issues currently available, in press, or in preparation

	Dates Covered	Report Number
1974	July 74 - Oct. 74	EPA-670/2-75-003
1975	Nov. 74 - Feb. 75	EPA-670/2-75-044
	Feb. 75 - Apr. 75	EPA-670/2-75-059
	May 75 - July 75	EPA-600/2-76-129
	Aug. 75 - Oct. 75	EPA-600/2-76-113
1976	Nov. 75 - Jan. 76	EPA-600/2-76-185
	Feb. 76 - Apr. 76	EPA-600/2-76-215
	May 76 - July 76	EPA-600/2-76-266
	Aug. 76 - Oct. 76	EPA-600/2-77-037
1977	Nov. 76 - Jan. 77	EPA-600/2-77-075
	Feb. 77 - Apr. 77	EPA-600/2-77-111
	May 77 - July 77	EPA-600/2-77-243
	Aug. 77 - Oct. 77	EPA-600/2-78-005
Vol. 5 No. 1	Nov. 77 - Jan. 78	EPA-600/2-78-071
Vol. 5 No. 2	Feb. 78 - May 78	EPA-600/7-78-160
Vol. 5 No. 3	June 78 - Sep. 78	Submitted 10/78
Vol. 5 No. 4	Oct. 78 - Dec. 78	Submitted 1/79

For complete ordering information, please see Appendix B.

ABBREVIATIONS/ACRONYMS

atm	atmosphere
bbl	barrel
C	carbon
°C	degrees centigrade
cm	centimeter
COW	crude Oil Washing
DWP	deepwater port
dwt	dead weight ton
EIS	environmental impact statement
°F	degrees Fahrenheit
ft	foot
g	gram
gal	gallon
GC	gas chromatography
GLC	gas-liquid chromatography
gpd	gallons per day
gph	gallons per hour
gpm	gallons per minute
ha	hectare
hr	hour
in	inch
IR	infrared
kg	kilogram
km	kilometers
kn	knot
L	liter
lb	pound
LC	liquid chromatography
LD	lethal dose
LNG	liquefied natural gas
LOT	load on top
LPG	liquefied petroleum gas
m	meter
mg	milligram
mi	miles
min	minute
ml	milliliter
mm	millimeter
MS	mass spectrometry
N	nitrogen
O	oxygen
OCS	outer continental shelf
OPR	OIL POLLUTION REPORTS, formerly OIL SPILL AND OIL POLLUTION REPORTS
oz	ounce
PAH	polycyclic aromatic hydrocarbon
pH	the negative log of the H ion concentration
ppb	part per billion
ppm	part per million
SBT	segregated ballast tank
sp.	species
TLC	thin-layer chromatography
UK	United Kingdom
US	United States
USSR	Union of Soviet Socialist Republics
UV	ultraviolet
VLCC	very large crude carrier
vs	versus
WSF	water soluble fraction
wt	weight
yr	year
µ	micron
µg	microgram
%	percent
/	per

ABBREVIATIONS/ACRONYMS (continued)

API	American Petroleum Institute
ASTM	American Society for Testing and Materials
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
DOE	Department of Energy
EPA	Environmental Protection Agency
ERDA	Energy Research and Development Administration
FOA	Food and Agricultural Organization
FEA	Federal Energy Administration
IMCO	International Maritime Consultative Organization
NASA	National Aeronautics and Space Administration
NBS	National Bureau of Standards
NOAA	National Oceanic and Atmospheric Administration
NTIS	National Technical Information Service
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USGS	United States Geological Survey
USN	United States Navy

SECTION I. REPORTS, PUBLICATIONS, AND PATENTS

A. OIL POLLUTION DETECTION AND EVALUATION

1. REPORTING

C-1175-78
AMLWCH HOSE RUPTURE AND SPILL (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(2):2.

Oil transfer, Tankers, Spill cleanup, UK, Oil terminals, *Amlwch spill

On October 10, 1978, a floating hose from a single buoy mooring ruptured during offloading of an oil tanker cargo, resulting in a spill of 200 tons of light crude oil into the Irish Sea at northern Anglesey, Wales. Spill response measures and the movement of the oil slicks out to sea are briefly described.

C-1176-78
AMLWCH SLICK RETURNS TO SHORE (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(4):2.

Oil slicks, Shorelines, Beach cleanup, Dispersants, Spill cleanup, UK, *Amlwch spill

Oil slicks believed to have been controlled and dispersed earlier, started coming ashore on October 19, 1978, polluting 12 km of shoreline near Caernarvon, Wales. Beach cleanup operations involved the use of bulldozers and high pressure jets; additional dispersants were used to disperse offshore slicks.

C-1177-78
AMLWCH SLICK MOVES EASTWARD (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(5):2.

Oil slicks, Oil terminals, Dispersants, Biological effects, Birds, Estuaries, Coasts, UK, *Amlwch spill

Following a hose rupture and spill of about 100 to 240 tons of crude oil at the Amlwch Oil Terminal on October 10, 1978, several kilometers of coastline and estuary have been impacted by the oil. Use of dispersants may have formed emulsions that are difficult to clean up. In the River Conway estuary some 250 seriously oiled birds have been reported, but little damage to commercial mussel beds and intertidal organisms is apparent.

C-1178-78
ANOTHER OIL SUPERTANKER DISASTER NARROWLY AVERTED (news brief)
Anon. 1978.
Marine Pollution Bulletin 9(8):199.

Tankers, English Channel, Surveillance, Safety, *Traffic control

A 267,000 ton Kuwaiti oil tanker, carrying a fifth more oil than the Amoco Cadiz, nearly grounded in the Dover Straits only five weeks after the Amoco Cadiz spill due to a gyro compass failure. The captain did prevent the accident once alerted by the coastguard who noted the dangerous position on their radar. The incident illustrates the necessity for making the traffic control reporting system in the English Channel mandatory.

C-1179-78
CHRISTOS BITAS GROUNDING AND SPILL (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(3):1.

Oil spills, UK, Tankers, Oil transfer, Dispersants, *Christos Bitas spill

On October 12, 1978, the Greek tanker Christos Bitas began spilling an estimated 3000 tons of Iranian crude oil, after grounding about 16 km off Milford Haven, Pembrokeshire, Wales. By October 13, several tugs were spraying dispersants onto the resulting oil slicks, and oil transfer and lightering operations were initiated the following day.

C-1180-78
CHRISTOS BITAS SALVAGE OPERATIONS CONTINUE (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(4):1.

Oil spills, UK, Tankers, Oil transfer, Environmental effects, Birds, *Christos Bitas spill, *Salvage operations

The Greek tanker Christos Bitas spilled an estimated 3000 tons of crude oil into St. Georges Channel off Milford Haven, beginning on October 12, 1978. By October 21, nearly 36000 tons of the remaining cargo had been offloaded, leaving nearly 1000 tons in the damaged tanker. Environmental impact was significant; a total of about 1400 to 2300 birds are believed to have been oiled and killed by the incident.

C-1181-78
CHRISTOS BITAS SINKING (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(5):1.

Oil spills, Oil slicks, UK, Tankers, Shorelines, *Christos Bitas spill

After grounding and spilling about 3000 tons of crude oil on October 12, 1978 the tanker Christos Bitas was found to be unsuitable for salvage or repair and was towed to a sinking site nearly 500 km west of Fastnet Rocks, Ireland. With all but 1000 tons of cargo successfully transferred, the tanker was sunk on October 31. Despite dispersant operations after the initial spillage, oil slicks damaged over 50 km of shoreline at North Devon on October 27.

C-1182-78
CORRODED PIPELINE SPILLS OIL IN CISNE, ILLINOIS (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(8):2.

Spill cleanup, Pipelines, Oil spill, EPA, Illinois, Rivers

About 318,000 L (84,000 gals) of crude oil spilled into a small tributary of the Elm River in Cisne, Illinois on November 16, 1978, caused by pipeline failure due to corrosion. Containment booms and EPA-coordinated cleanup crews were quickly deployed at the scene; by November 20, all but about 30,000 L (8000 gals) had been removed from the river and its tributary.

C-1183-78
ELENI V FIASCO (news brief)
Anon. 1978.
Marine Pollution Bulletin 9(7):170.

Oil spills, Spill cleanup, Government agencies, Coasts, England, *Eleni V

On May 6,1978 the 1600 ton Greek tanker, Eleni V, collided with a freighter off the coast of England and was sliced in two. Approximately 3000 tons of oil spilled, polluting 20 mi of coastline. The lack of one single government department that is responsible for control of both salvage and cleanup operations is partially the reason for the inadequate emergency operations.

C-1184-78
"ELLA HEWITT" OIL RELEASE (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(1):2.

Spill cleanup, Oil discharges, Leakage, Contamination, Ships, Ireland, Environmental effects

The sunken British trawler Ella Hewitt released up to 136,400 L (36,000 gal) of diesel fuel after detonation of the wreck by the British Navy. Since sinking in 1962 with 180 tons of diesel fuel onboard, the submerged trawler had released repeated oil slicks that fouled nearby Irish coastlines, killed thousands of seabirds, and contaminated fishermen's catches. Pollution control vessels cleaned up the oil released by the explosion.

C-1185-78
FAULTY VALVE LEAKS OIL AT YOKKAICHI, JAPAN (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(7):1.

Tankers, Oil spills, Leakage, Spill containment, Japan, Oil transfer, *Ryuyo Maru spill

The Japanese tanker Ryuyo Maru spilled about 50,000 L (13,000 gals) of crude oil on November 8, 1978 as the cargo was being unloaded. A faulty valve was blamed for the leakage. Although containment booms and 17 spill recovery vessels were deployed, some oil washed over the containment boom and damaged a nearby seaweed farm.

C-1186-78
GRAND BAY PIPELINE RUPTURE AND SPILL (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(3):2.

Pipelines, Leakage, Spill containment, Louisiana

On October 12, 1978 about 94,500 L (25,000 gals) of oil spilled from a ruptured pipeline into a canal near Venice, Louisiana. Containment booms were quickly deployed and contained nearly all of the oil. Mechanical and manual cleanup operations were expected to last into late October.

C-1187-78
HYGRADE BARGE SPILL (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(2):2.

Spill cleanup, Ships, Rivers, USCG, New York, **Hygrade No. 2* barge spill

Up to 34,000 L (9000 gal) of No. 2 fuel oil spilled into the Hudson River in New York when the oil barge *Hygrade No. 2* grounded on October 6, 1978 and ruptured two tanks. USCG-initiated spill containment and cleanup measures are briefly described, and the USCG said the spill caused no significant environmental damage.

C-1188-78
INQUEST ON *AMOCO CADIZ* CONTINUES (news brief)
Anon. 1978.
Marine Pollution Bulletin 9(8):199.

Amoco Cadiz spill, Liability, *Inquest

Three causes for the *Amoco Cadiz* grounding were cited by the council for Liberia Captain Frank Wiswall at the conclusion of the Liberian government inquiry. They were failure of the ship's steering gear, lack of effective assistance once the ship grounded, and bad weather which inhibited effective aid from tugs. The inquiry was told earlier that the captain made several "excusable errors in judgement."

C-1189-78
NEWTOWN CREEK LEACHING FROM UNKNOWN SOURCE (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(3):2.

Leakage, Detection, spill cleanup, USCG, New York

Oil from an unknown source has been leaking into Newtown Creek, an industrial waterway in Brooklyn, New York. The spillage was detected on September 2, 1978 by USCG overflights; since that time, 151,000 L (40,000 gals) of an oil-water mixture have been recovered by cleanup contractors.

C-1190-78
OIL WASHES ONTO TRINIDAD BEACHES (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(7):2.

Oil slicks, Sources, Movement, Beaches, *Trinidad

After an oil slick was discovered off Trinidad's northwest peninsula on October 31, 1978 winds and currents pushed the oil onto beaches and fouled small boats and fishing nets. The source of the spill is unknown but is believed to have been caused by a ship near Port-of-Spain.

C-1191-78
PORT SUTTON SPILL FROM UNKNOWN SOURCE (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(2):1.

Spill cleanup, Ports, Bays, Intertidal zone, Florida, USCG, Environmental effects, *Port Sutton spill

On October 5, 1978, a large quantity of oil, later estimated to total about 150,000 L (40,000 gal) began to spill into the Port Sutton area near Tampa, Florida, from an unidentified source. This article briefly reviews the USCG-initiated spill response measures, conducted by 4 Florida cleanup companies. The spreading slick caused heavy damage to mangrove swamps and intertidal animals, especially crustaceans. By October 11 nearly 120,000 L (31,000 gal) oil had been recovered, and cleanup operations were expected to continue until early November 1978.

C-1192-78
PORT SUTTON SPILL UPDATE (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(3):2.

Spill cleanup, Ports, Source identification, USCG, EPA, Florida, *Port Sutton spill, *Cleanup costs

Cleanup operations are continuing in Tampa, Florida, following an oil spill in Port Sutton on October 5, 1978. As of October 17, about 132,000 L (35,000 gals) of Bunker C and diesel oil were collected at a cleanup cost of $300,000 so far. EPA is assessing the environmental impact of the spill, and the USCG is conducting analyses of spill samples in order to identify the responsible party.

C-1193-78
VIOLATOR DETERMINED IN PORT SUTTON SPILL (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(6):1.

Source identification, Law enforcement, USCG, Florida, Liability, *Port Sutton spill, *Cleanup costs

The USCG has pinpointed the source of the Port Sutton, Florida, oil spill of October 5, 1978 but will not release the name of the vessel pending notification of the owners. Cleanup costs for the spill, presently in excess of $700,000, are currently paid by federal funds. Now that the spill violator is known, the USCG will take action to recover the money.

C-1194-78
USCG IDENTIFIES PROBABLE SOURCE OF PORT SUTTON SPILL (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(8):1.

Source identification, Law enforcement, USCG, Florida, Sampling, Liability, Tankers, *Port Sutton spill

The Panamanian bulk carrier Howard Star has been identified as the vessel responsible for the Port Sutton, Florida oil spill of October 5, 1978, based on matches of the spill samples with oil samples from nearby vessels. The various penalties that can and may be levied against the vessel's owners and operators by the USCG and Florida state authorities are briefly discussed.

C-1195-78
ROUND-THE-WORLD-NEWS: ISRAEL (news brief)
Anon. 1978.
Marine Pollution Bulletin 9(8):202.

Oil spills, Pollution control, Israel

Fourteen cases of oil spill pollution were reported for 1976 in the Eilat area, according to the Fourth Annual Report by the Environmental Protection Service. A lack of proper equipment for dealing with marine pollution still exists.

C-1196-78
RUPTURED PIPELINE SPILLS OIL NEAR FARMINGTON, UTAH (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(7):1.

Pipelines, Oil spills, Inland, Spill containment, Incineration, *Utah

Between 227,000 and 400,000 L (60,000 to 105,000 gals) of light crude oil started to spill from a ruptured Amoco pipeline on November 8, 1978. The spill traveled through a marsh, small pond and culvert into canals connecting with Farmington Bay, a freshwater inlet of the Great Salt Lake. Rapid deployment of booms and other measures prevented all but about 40 to 60 L of oil from reaching the Bay. Controlled burns were agreed upon as the fastest, most efficient way to rid the affected areas of the oil.

C-1197-78
FARMINGTON BAY CLEANUP NEARS COMPLETION (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(8):1.

Spill cleanup, Incineration, Pipelines, Inland, *Utah

By November 24, 1978 controlled burns and cleanup crews had removed over 85% of the 404,400 L (107,100 gals) of crude oil spilled from a ruptured Amoco pipeline near Farmington Bay, Utah, on November 8. An improper valve change on the pipeline had caused the spillage. Manual cleanup will continue into December.

C-1198-78
SPOTTING POTENTIAL POLLUTERS BY COMPUTER
Anon. 1977.
Tanker & Bulker International 3(8):23-25.

Information systems, Tankers, Safety, Statistical analysis, Pollution prevention, *Risk analysis, *Marine Mangement Systems Inc.

"Marine Management Systems, Inc. (MMS) of Stamford, Connecticut, recently began a computer service which provides current information on the casualty and safety performance of tankers, combination carriers, and LNG vessels to assist the charterer in the selection of ships with the best performance records to minimize the risk of tanker oil spills and other seagoing casualties. The service is part of MMS' global Marine Information Service (MIS) which uses GEC's worldwide remote computing network."

[from Oceanic Abstracts 15(2):#78-02059. 1978]

C-1199-78
STAWANDA SPILL (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(2):2.

Spill cleanup, Dispersants, Tankers, Harbors, *South Africa, *Stawanda spill

Oil spilled from the Greek motor tanker Stawanda into the harbor at Durban, South Africa, while the vessel was loading its cargo on October 3, 1978. In response, a cleanup vessel sprayed dispersants both inside the harbor and at the entrance for 8 hours.

C-1200-78
TANKER IRENE S. LEMOS COLLIDES ON MISSISSIPPI (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(7):2.

Oil spills, Tankers, USCG, Louisiana, Spill cleanup, Mississippi River, *Irene S. Lemos spill

About 5700 to 7600 L (1500 to 2000 gals) of Bunker C oil spilled from the Greek tanker Irene S. Lemos into the Mississippi River after the vessel collided with another ship on November 9, 1978, near Belle Chasse, Louisiana. Spill cleanup efforts included extensive use of booms, skimmers, portable pumps, and vacuum trucks; the cleanup activities were overseen by USCG personnel.

C-1201-78
TAR BALLS IMPACT SWEDISH COAST (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(8):2.

Tar, Coasts, Environmental effects, Birds, Sweden

Tar balls began washing ashore on November 20, 1978 along the western coast of Sweden between Lysekil and Koster. The Swedish Coast Guard sampled and identified the material as weathered crude oil. Some 1000 birds were found fouled and dead, and the Coast Guard shot another 1000 oiled birds.

C-1202-78
TAR BALLS WASH ASHORE AT CHESAPEAKE BAY (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(6):2.

Tar, Coasts, Chesapeake Bay, Beach cleanup, Source identification, USCG

On November 4, 1978 tar balls totalling an estimated 23,000 L (6000 gals) of oil polluted an area near Cove Point, Maryland, on the west side of Chesapeake Bay. Beach cleanup was initiated by the USCG, and tar samples were gathered for analysis and possible source identification.

C-1203-78
WEST HACKBERRY BLOW-OUT AND SPILL (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(1):1.

Blowouts, Spill containment, Spill cleanup, Oil wells, Lakes, Louisiana, USCG, DOE, *Strategic Petroleum Reserve

Federal spill cleanup measures taken in response to a well blowout on September 21, 1978 at West Hackberry, Louisiana, are described. The blowout occurred at Well No. 6 of the US Strategic Petroleum Reserve, resulting in a spill of 40,000-45,000 bbl of crude oil around the pad and in nearby Black Lake. Various types and configurations of booms were applied to contain the oil, and skimming operations removed about 30,800 bbl of oil by September 27. The environmental impacts of the spill and of an associated oil fire are currently being assessed by a DOE environmental team.

C-1204-78
WEST HACKBERRY BLOW-OUT AND SPILL UPDATE (news brief)
Anon. 1978.
Oil Spill Intelligence Report 1(2):1.

Blowouts, Spill cleanup, Oil wells, Lakes, Louisiana, USCG, DOE, *Strategic Petroleum Reserve

Coordianted USCG-DOE federal spill cleanup operations at the US Strategic Petroleum Reserve in West Hackberry, Louisiana, were completed on October 11, 1978, following a well blowout on September 21. At a public hearing on the incident, "local environmentalists testified that the oil spill caused negligible environmental damage to Black Lake and that DOE did a good job containing the pollution." In total, nearly 50,000 bbl of oil were recovered from Black Lake and the well pad.

2. MONITORING

C-1205-78
INSTALLATIONS FOR MONITORING OIL CONTENT
[Bailey Meters & Contractors Ltd.]. 1977.
Australian Patent 485,370

Monitoring, Tankers, Ballast, Oil discharges, Equipment, Patent, Analytical techniques, Detection

A device for monitoring the oil content of tanker ballast discharge is described. The system involves sampling of a fraction of the discharge flow, exposure of the sample to ultraviolet radiation, and detection of fluorescence by a photoelectric cell. An alarm is sounded when the cell receives radiation greater than a predetermined value.

[from Petroleum Abstracts 17(51):#242,219. 1977]

C-1206-78
OIL DETECTOR/ALARM (product information)
[Baird-Atomic]. 1978.
Environmental Science and Technology 12(5):602.

Monitoring, Detection, Wastewaters, Oil discharges, Product information, Equipment

"The instrument continuously monitors effluent discharges to detect trace levels of oil in water. Oil concentration is displayed, in ppm, on a meter on the front panel. Two adjustable threshold alarms are part of the unit."

C-1207-78
PETRO-TRACK MEASURES SUBSURFACE OIL
Bender, E. 1978.
Sea Technology 19(4):28.

Monitoring, Equipment, Hydrocarbons, Product information, *Fluorometry, *Petro-track system, Detection

With an operating depth of 0 to 100 m (0-327.5 ft) the 925 Petro-track underwater fluorometer system continuously monitors and prints out information on oil concentration, time, position, temperature, and depth. It is based on detection of low boiling point aromatic hydrocarbons. Developed by Environmental Devices Corporation (ENDECO), the Petro-track system has performed successfully in field trials.

C-1208-78
OIL-IN-WATER MONITOR (product information)
[Biospherics]. 1978.
Environmental Science and Technology 12(5):601.

Monitoring, Dispersions, Equipment, Product information, *Oil-in-water

"The unit monitors dispersed oil in water by forward light scattering and transmittance techniques. The monitor identifies and provides alarm and control action for 1 part oil in 1 million parts water."

C-1209-78
BENZENE MONITOR
[GOW-MAC Instrument]. 1978.
Environmental Science and Technology 12(6):728.

Monitoring, Product information, Equipment, Chromatography, Aromatic hydrocarbons, *Benzene

"The FID gas chromatograph can perform chromatographic analysis of 1 ppm benzene with 3 min." [possibly oil pollution related]

C-1210-78
BIOINDICATORS OF POLLUTION (A BIBLIOGRAPHY WITH ABSTRACTS)
Harrison, E.A. 1977.
Report NTIS/PS-77/0993. 248 p. Report for 1964 - Nov 77. (Supersedes NTIS/PS-76/0868, NTIS/PS-75/796, and NTIS/PS-75/024.)

Monitoring, Detection, Bioindicators, Microorganisms, Marine organisms, Bibliographies

This updated bibliography contains 243 abstracts (with 54 entries new to previous editions) concerning the use of microorganisms, animals, plants, and fishes for air and water pollution detection. Among the organisms discussed are algae, bacteria, aquatic plants, oysters, snails, clams, insects, annelids, amphibians, and fungi. [possibly oil pollution related]

[from Government Reports Announcements 78(2):#NTIS/PS-77/0993/4GA. 1978]

C-1211-78
SPECIFIC BIOLOGICAL METHODS FOR PETROLEUM BASELINE AND POLLUTION MONITORING
Penrose, W.R. 1978.
Marine Pollution Bulletin 9(9):231-234.

Monitoring, Bioindicators, Analytical techniques, Baseline studies, Hydrocarbons, Bacteria, Fish, Oceans, Freshwater

The production of the liver enzyme aryl hydrocarbon hydroxylase (AHH) is a specific response, in vertebrates, to the ingestion of oil, reflecting the degree of pollution as well. Lower cost and greater efficiency are advantages bioassay for AHH offers over chemical analysis of water for hydrocarbons at trace levels. Another sensitive and specific biological indicator is the proportion of oil-degrading bacteria to total heterotrophic bacteria.

C-1212-78
OIL SENSOR (product information)
[Rambie, Inc.]. 1977.
Environmental Science and Technology 11(12):1123.

Monitoring, Equipment, Product information, Hydrocarbons, *Infrared sensor

Operating continuously and unaffected by floating debris, waves, water level changes and other infrared sources, the infrared sensor scans a water surface area of any length up to 160 m (500 ft). Floating hydrocarbons activate an alarm.

C-1213-78
SELF-CLEANING OIL DETECTOR
[Safare Crouzet SA]. 1977.
French Patent 2,327,534

Monitoring, Detection, Leakage, Equipment, Patent, Hydrocarbons,

An apparatus designed to detect heavy hydrocarbons in water is described. Applications include detection of oil leaks around submerged pipelines and tanks, and signaling of oil spills.

[from Petroleum Abstracts 17(39):#238,791. 1977]

C-1214-78-78
APPARATUS FOR MONITORING PUMPS AND PIPELINES
Schierhorn, M. 1977.
German Patent 1,775,046

Monitoring, Pipelines, Oil transfer, Leakage, Detection, Patent

The device monitors pipelines for leaks by continually measuring pressure and flow rate. An alarm is triggered when an increased flow rate and decreased trend in pressure occur simultaneously.

[from Petroleum Abstracts 17(51):#242,212. 1977]

C-1215-78
CHEMICO-OCEANOLOGICAL STUDIES [in Russian]
Skopintsev, B.A., and V.N. Ivanenkov (eds.). 1977.
Moskva, USSR, Nauka, 1977. 224 p. Proceedings of: 7 Vsesoyuznaya konferentsiya po khimii okeana, Moskva, USSR, March 1975.

Monitoring, Oceans, Sorbents, Detection, Contaminants

"The proceedings of the 7th All-Union Conference on the chemistry of seas and oceans deals with chemical air-water interaction, chemical composition of atmospheric precipitation, the cyles of N and P compounds, accumulation of microelements in sea water and their extraction using selective, sorbents methods of determining pollutants and oil pollution monitoring." [sic]

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #3416-1Q8. 1978]

C-1216-78
AUTOMATING POLLUTION MEASUREMENTS
Snape, F. 1976.
International Laboratory (September/October):42-49.

Monitoring, *Automation, Sampling, Equipment, *Data processing

A discussion is presented on the considerations involved in computerized monitoring of the air and water environments. The importance and purposes of pollution measurements are outlined and some of the problems associated with water sampling, including monitor siting, monitor inlet position, and choice of sampling device are reviewed. A microprocessor-based pollution data reductor is suggested as a means for handling the large volume of data resulting from automated pollution monitoring. [possibly oil pollution related]

C-1217-78
OIL IN WATER ANALYSIS SYSTEM (product information)
[Teledyne Analytical Instruments]. 1978.
Environmental Science and Technology 12(2):226.

Monitoring, Analytical techniques, Equipment, Wastewaters, Refineries, Product information, *Photometric analyzer

"This dual wavelength photometric analyzer was developed for monitoring recycled cooling water, effluent from refineries and discharges from wastewater treatment plants. Variations of 0.1 ppm in process streams can be detected with an accuracy better than ±2%."

C-1218-78
IDENTIFICATION, INDEXING AND EXCHANGE OF DATA ON ENVIRONMENTAL POLLUTANTS
Thompson, G.L. 1977.
Joint Conference on Sensing of Environmental Pollutants. Washington, DC, American Chemical Society, 1978. p. 238-240.

Monitoring, Contaminants, Information systems, Source identification, *National Water Data Exchange

"The National Water Data Exchange (NAWDEX) program for identification and monitoring [of] water pollutants is discussed." [possibly oil pollution related]

[from Chemical Abstracts 88(26):#197306a. 1978]

C-1219-78
APPARATUS FOR DETERMINING FREE OIL IN OIL-CONTAINING SLUDGE
Uematsu, Y., and T. Morimura. 1977.
Japanese Kokai (unexamined patent application) 77,119,293

Monitoring, Design-engineering, Wastewaters, Sludge, *Lasers, *Oil film, Patent

"A water tank is stirred slowly to a state as if the sludge were flowing. A constant amount of sample is supplied to it and oil is separated. A visible light or a laser light irradiates the oil floating on the liquid surface. From the resulting reflected light, the oil film is measured. The method is especially useful for determining oil contents on river water and industrial wastewaters."

[from Chemical Abstracts 88(24):#176965z. 1978]

3. REMOTE SENSING

C-1220-78
FRENCH PROGRESS IN TELEDETECTION OF OIL SPILLS
de Castro, G. 1977.
Ship and Boat International 30(10):35.

Remote Sensing, Oil spills, Surveillance, France, Equipment

"The French equipment is manufactured for their own particular requirements, their economic situation, and non-continental size of the country. The scanning method, which is described in detail, is very effective and quick. From cross-checking signals the exact position of the offending vessel can be located."

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #4585-1Q8. 1978]

C-1221-78
TRACKING POLLUTANTS FROM A DISTANCE
Melfi, S.H., J.D. Koutsandreas, and J. Moran. 1977.
Environmental Science and Technology 11(1):36-39.

Remote Sensing, Source identification, Oil slicks, EPA, Monitoring, Analytical techniques, Pollution control, *Laser fluorescence

The application by EPA of remote sensing methods to pollution monitoring is discussed. One pollutant-specific method under development is laser fluorescence which can monitor oil on a water surface.

4. SAMPLING

C-1222-78
ENUMERATION OF PETROLEUM-DEGRADING MARINE AND ESTUARINE MICROORGANISMS BY THE MOST PROBABLE NUMBER METHOD
Mills, A.L., C. Breuil, and R.R. Colwell. 1978.
Canadian Journal of Microbiology 24(5):552-557.

Sampling, Microorganisms, Biodegradation, Analytical techniques, *Enumeration, *Most probable number method

"Several media designed for use in a most probable number (MPN) determination of petroleum-degrading microorganisms were compared. The best results, i.e., largest numbers, were obtained using a buffered (32 mM $PO_4^{=}$) liquid medium containing 1% hydrocarbon substrate."

5. ANALYSIS

C-1223-78
THE USE OF GAS-LIQUID-SOLID CHROMATOGRAPHY IN ENVIRONMENTAL AND TRACE ANALYSIS
Bertoni, G., P. Ciccioli, C. Severini, and F. Bruner. 1978.
Chromatographia 11(12):55-58.

Chromatography, Chemical analysis, *Trace analysis

The separation of industrial trace products as well as separations of environmental concern are demonstrated. The column characteristics for obtaining the best separation power are discussed. [possibly oil pollution related]

[from Chemical Abstracts 88(24):#176302f. 1978]

C-1224-78
ENVIRONMENTAL ANALYSIS
Ewing, G.W. 1977.
New York, Academic Press, 1977. 344 p.

Analytical techniques, Chromatography, Spectroscopy, *Case histories

Papers presented at the Third Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies in Philadelphia, Pennsylvania, 1976, are contained in this book. "The papers provide a background on current techniques and procedures, or present a case history of a particular application." [possibly oil pollution related]

[from New Technical Books 63(2):#287. 1978]

C-1225-78
SOPHISTICATED EQUIPMENT FINGERPRINTS CRUDE OILS
Flory, D.A., A.E. Rubenstein, H.A. Lichtenstein, C.B. Koons, et al. 1978.
Oil and Gas Journal 76(8):102-107.

GC/MS, Analytical techniques, Crude oil, Oil spills, Source identification

Computerized GC/MS analysis of selected crude oil fractions, primarily the higher molecular weight saturated hydrocarbons, permit correlation of various crude oils in relation to the reservoir zones from which they originate. Details of the analytical techniques and applications are presented. The technique should be applicable for fingerprinting oil spills.

[from Chemical Abstracts 89(4):#27061v. 1978]

C-1226-78
FLUORIMETRIC DETERMINATION OF POLYCYCLIC AROMATIC HYDROCARBONS IN LEAVES, BLOOMS, AND PHYTOPLANKTON [English summary]
Hellmann, H. 1977.
Fresenius Zeitschrift fuer Analytische Chemie 287(2-3):148-151.

Chemical analysis, PAH, Phytoplankton, Spectrometry, *Fluorimetric determination

"The concentration of polycyclic aromatic hydrocarbons in photo-assimilating organisms is very small (ppb-range). It can only be determined after separation of accompanying polar components and the saturated hydrocarbons, among others by fluorescence spectrometry." [possibly oil pollution related]

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #4538-1Q8. 1978]

C-1227-78
INTERLABORATORY COMPARISON OF DETERMINATIONS OF TRACE LEVEL PETROLEUM HYDROCARBONS IN MARINE SEDIMENTS
Hilpert, L.R., W.E. May, S.A. Wise, S.N. Chesler, and H.S. Hertz. 1978.
Analytical Chemistry 50(3):458-463.

Hydrocarbons, Chemical analysis, Sediments, Baseline studies, *Interlaboratory comparison

"Results of the determination of petroleum hydrocarbons at the μg/kg (ppb) level in marine sediments have been compared among eight laboratories. Values for concentrations of total extractable hydrocarbons scattered between 9 to 500 μg/kg and 49 to 6625 μg/kg for the two sites examined. Scatter of results for hydrocarbons in the gas chromatographic elution range, the most abundant aliphatic and aromatic hydrocarbons, and total polynuclear aromatic hydrocarbons (four rings and larger) were similar....The data are discussed with regard to the reliability and comparability of current methods for environmental baseline measurements."

C-1228-78
HYDROCARBONS IN SURFICIAL SEDIMENTS FROM THE SCOTIAN SHELF
Keizer, P.D., J. Dale, and D.C. Gordon, Jr. 1978.
Geochimica et Cosmochimica Acta 42(2):165-172.

Hydrocarbons, Atlantic Coast, Biogenic hydrocarbons, Offshore drilling, Sediments, Sources, Contamination, *Nova Scotia

Surface marine sediments from the Scotian Shelf, some from near abandoned well drilling sites, were analyzed for hydrocarbon contents and compositions. Most hydrocarbons were derived from biogenic sources, showing an inverse concentration correlation with increasing distance from the mainland and a strong odd C preference in the n-alkanes. Contamination from petroleum sources was most apparent between Halifax and Emerald Bank, and at the abandoned drill sites there was evidence of slight alteration in the hydrocarbon composition.

[from Chemical Abstracts 89(4):#27943j. 1978]

C-1229-78
DETERMINATION OF THE SOLUBILITY OF HYDROCARBONS IN WATER [in Russian]
Korenman, I.M., and R.P. Aref'eva. 1978.
Zhurnal Prikladnoi Khimii (Leningrad) 51(4):957-958.

Hydrocarbons, Aromatic hydrocarbons, Solubility, Chemical analysis, Surfactants

"The solubilities of hexane, cyclohexane, C_6H_6, PhMe, and PhEt were determined in H_2O and aqueous NcCl (0-2 M) at 25^{o}. NaCl has a salting-out effect on hexane and C_6H_6. An indicator acid in H_2O was extracted by the organic phase as soon as 2 phases formed resulting [in] a large pH increase for the aqueous phase and thus allowing a solubility titration to be carried out. Another method involved determination of concentration changes in unsaturated solutions on adding a surfactant." [possibly oil pollution related]

[from Chemical Abstracts 88(26):#198636v. 1978]

C-1230-78
OIL POLLUTION ANALYSIS FOR WATER LABORATORIES
Matthews, P.J. 1977.
Institute of Petroleum Report, No. 3. Report IP 77-003. 21 p.

Analytical techniques, Industries, Pollution prevention, Water quality

An increased interest in the problems caused by oil pollution has resulted in cooperation by the petroleum and water industries on methods of prevention and on oil pollution analysis. "The reorganization of the water industry into large authorities dealing with all aspects of the water cycle afforded an opportunity to bring together the analytical methodology of quantification and identification." This paper reviews the 'state of the science' and summarizes the methods available to water laboratories in either industry.

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #4470-1Q8. 1978]

C-1231-78
AN ANALYSIS OF PETROLEUM HYDROCARBONS IN THE MARINE ENVIRONMENT: RESULTS OF AN INTERLABORATORY COMPARISON EXERCISE
May, W.E., S.N. Chesler, B.H. Gump, And H.S. Hertz. 1978.
Journal of Environmental Science and Health A 13(5&6):403-410.

Analytical techniques, Sampling, Hydrocarbons, *Exxon, *NBS, *Interlaboratory comparison

"An interlaboratory comparison exercise, carried out by Exxon Research and Engineering and the National Bureau of Standards, is described. Marine water samples obtained on a joint cruise using both laboratories' water samplers were split and analyzed at both laboratories. Both samplers were found to be acceptable for the determination of hydrocarbons at μg/kg (ppb) levels. Differences in analyses were traceable to the analytical schemes employed by each laboratory."

C-1232-78
DIRECT DETERMINATION OF TRACE AMOUNTS OF HYDROCARBONS AND NAPHTHENIC ACIDS IN WASTE AND SURFACE WATERS
Mosescu, N., G. Kalmutchi, and I.V. Pop. 1976.
Romanian Patent 60,217

Analytical techniques, Detection, Spectroscopy, Hydrocarbons, Wastewaters, Patent

"Trace amounts of hydrocarbons and naphthenic acids were detected in waste and surface waters by absorption spectroscopy at 200-345 nm. The accuracy and sensitivity of the method were 1% and 0.08 mg/L, respectively.

[from Chemical Abstracts 88(26):#197389e. 1978]

C-1233-78

STUDIES OF FUEL OIL COMPONENTS IN FOOD. EFFECT OF ULTRAVIOLET IRRADIATION ON ORGANIC SULFUR COMPOUNDS IN FUEL OIL [in Japanese]
Nakamura, A., and T. Kashimoto. 1977.
Osaka-furitsu Koshu Eisei Kenkyusho Kenkyu Hokaku, Shokuhin Eisei Hen, Vol. 8:111-115.

Chemical analysis, Contamination, Chromatography, Fuel oil, Food web, *Dibenzothiophenes, *Seafood tainting

The UV stability of organic sulfur compounds in heavy fuel oils was studied in order to determine the route of seafood pollution from fuel oil spilled at sea. Absorption peaks of dibenzothiophenes on gas chromatographs after exposure to UV radiation was decreased. Absorbents and impurities retarded decomposition of dibenzothiophene by UV radiation.

[from Chemical Abstracts 88(25):#188315a. 1978]

C-1234-78

POLLUTION EVALUATION; THE QUANTITATIVE ASPECTS
Pickering, W.F. 1977.
New York, Dekker, 1977. 199 p. (Environmental Science and Technology Series, Vol. 2).

Analytical techniques, Sampling, Chromatography, Spectroscopy, Statistics

The principles involved in the analysis and evaluation of environmental pollution are covered. Included are chapters on significance of sampling and statistics, and principles of emission spectroscopy, gas chromatography, mass spectrometry, and neutron activation analysis. [possibly oil pollution related]

[from New Technical Books 63(2):#289. 1978]

C-1235-78

CONTRIBUTION TO THE IMPROVEMENT OF HYDROCARBON DETERMINATION IN WATER
Ranchet, J., and P. Clement. 1977.
Bulletin de Liaison des Laboratoires des Ponts et Chaussees, Vol. 91:67-71.

Chemical analysis, Hydrocarbons, Chromatography, Spectrometry, *IR analysis

Chromatographic separation of hydrocarbons in surface water is recommended before detection by IR spectrometry. The adsorbent used should be rinsed thoroughly enough for total recovery of the hydrocarbons. Absorption peaks at 2962, 2926, 2853, and, when aromatics are present, 3040 cm^{-1} should be included in the calculations for accurate results.

[from Chemical Abstracts 88(26):#197319g. 1978]

C-1236-78
PROCESSING FOR DETERMINING HYDROCARBONS AND HALOGENATED HYDROCARBONS DISSOLVED IN WATER
Schmidt, W. 1977.
German Patent 1,773,510

Analytical techniques, Chromatography, Hydrocarbons, Patent

A process is described using gas chromatographic analysis of the vapor phase, for the determination of hydrocarbons and halogenated hydrocarbons in water. [possibly oil pollution related]

[from Petroleum Abstracts 17(50):#241,966. 1977]

C-1237-78
QUANTITATIVE DETERMINATION OF PETROLEUM PRODUCTS IN SURFACE WATERS [in Russian]
Semenov, A.D., A.G. Stradomskaya, and L.F. Pavlenko. 1977.
Problemy Analiticheskoi Khimii, No. 5:157-168.

Chemical analysis, Petroleum products, *Surface waters

Summary not available.

[from Chemical Abstracts 88(24):#176790p. 1978]

C-1238-78
DETERMINATION OF OILS IN WATER USING IR ABSORPTION SPECTROMETRY AND THIN-LAYER CHROMATOGRAPHY. PART 1. [in Japanese]
Uekaki, A., K. Terada, T. Sato, H. Sato, and M. Sone. 1976.
Miyagi-Ken Kogai Gijutsu Senta Hokoku, Vol. 4:94-97.

Analytical techniques, Spectrometry, Chromatography, *IR analysis

A 5 cm or 10 cm quartz cell was used for IR analysis of various oils including petroleum oils. The solvent used for the chromatography was 90:10:0.5 n + C_7H_{14} + petroleum ether--Et_2O, followed by treatment with I_2 vapor, UV light, and 50% H_2SO_4 spray, resulting in >90% recovery. "The differentiation of various lipids was possible using the additive nature of IR."

[from Chemical Abstracts 88(24):#176881u. 1978]

C-1239-78
HYDROCARBONS OF A CHITON
Yasuda, S., and N. Fukamiya. 1977.
Bulletin of the Japanese Society of Scientific Fisheries 43(10):1249.

Chromatography, Hydrocarbons, Mollusks, Biogenic hydrocarbons, *Chiton

The hydrocarbons of the mollusk Liolophura japonica, were analyzed because this organism feeds on algae scraped from the surface of rocks. "The unresolved peak envelope of a gas chromatogram of the n-alkanes...suggested that the animals were polluted by low levels of oil. However, the presence of considerable amounts of alkenes and squalene indicated that the major part of the hydrocarbons are biogenic."

C-1240-78
HYDROCARBONS OF GONADS OF SEA URCHINS
Yasuda, S., and N. Fukamiya. 1977.
Bulletin of the Japanese Society of Scientific Fisheries 43(10): 1175-1180.

Chromatography, Hydrocarbons, Echinoderms, Biogenic hydrocarbons, *Sea urchin gonads

The hydrocarbons of gonads of the sea urchins, Temnopleurus toreumaticus and Anthocidaris crassispina, were examined by gas liquid chromatography. The similarity of most of the hydrocarbons found in the urchin gonads with those of green algae suggests a dietary origin. "...Biological origin of the hydrocarbons and the absence of pollution by oil in the gonads of sea urchins used were clearly indicated by the predominance of C-17 n-alkane and C-17 n-alkene, the absence of phytane, and the lack of an unresolved envelope in their GLC."

C-1241-78
ELECTROANALYTICAL ESTIMATION OF SEAWATER POLLUTION BY ORGANIC SUBSTANCES. ANALYSIS OF NORTH ADRIATIC SAMPLES
Zvonaric, T., Z. Kozarac, V. Zutic, B. Cosovic, and M. Branica. 1976.
Rapport et procès-verbaux des réunions. Commission internationale pour l'exploration scientifique de la Mer Méditerranée, Monaco, 23(7):55-56.

Analytical techniques, Contaminants, Seawater, Surfactants, Source identification, Mediterranean Sea, *Electroanalysis

"Surfactant activity of organic pollutants and of surfactants of biological origin were studied by electroanalytical methods. ...The applicability of the electroanalytical methods for simple and rapid estimation of source and level of pollution of seawater by organic substances is discussed." [possibly oil pollution related]

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4):#4476-1Q8. 1978]

6. SOURCE IDENTIFICATION

C-1242-78
WHO SPILLED THE OIL
Bentz, A.P. 1978.
Analytical Chemistry 50(7):655A-658A.

Source identification, Analytical techniques, Chromatography, Spectroscopy, *Fluorescence, *IR analysis

The analytical methods used in oil spill source identification are discussed; those most suitable for analysis of weathered oils are thin-layer chromatography, gas chromatography, fluorescence, and IR spectroscopy. The use of more than one method assumes statistical confidence in the analysis and eliminates the effects produced by contaminants on individual methods.

C-1243-78
INVESTIGATION ON DRILLING CORES OF SEDIMENTS OF LAKE CONSTANCE. I. PROFILES OF THE POLYCYCLIC AROMATIC HYDROCARBONS. N-CONTAINING POLYCYLIC AROMATIC HYDROCARBONS, POLYCYCLIC AROMATIC HYDROCARBONS-PROFILE AND SOURCE OF EMISSION, HIGH BURDENED LAYERS 1965-1970 [English summary]
Grimmer, G., and H. Bohnke. 1977.
Zeitschrift fuer Naturforschung 32c(9-10):703-711.

Source identification, PAH, Sediments, Lakes, Germany, *Lake Constance

Thirty-two PAHs and 10 nitrogen-containing PAHs were identified from sediment layers in areas of Lake Constance, Germany, differently exposed to environmental burden. A comparative profile analysis is presented, and the qualitative and quantitative composition of the PAH fraction (PAH-profile) is determined. Results indicate that potential sources such as automobile traffic, petroleum, fuel oil, and used lubricating oil can be excluded. "Coal combustion smoke gas" appears to be the primary source.

C-1244-78
CHARACTERIZATION OF TAR BALLS BY HIGH SPEED GEL PERMEATION CHROMATOGRAPHY
Higashi, K., and K. Hagiwara. 1977.
Bunseki Kagaku 26(11):743-747.

Source identification, Chemical analysis, Chromatography, Tar. Crude oil, Fuel oil, *High speed gel permeation method

Chromatography of tar balls and detection at 254 nm resulted in chromatograms that enabled recognition of the tar balls as originating from crude oil, fuel oil B, or fuel oil C. The method shows satisfactory sensitivity and reproducibility.

[from Chemical Abstracts 88(26):#197310x. 1978]

C-1245-78
METHODS OF IDENTIFYING SOURCE OF PETROLEUM FOUND IN THE MARINE ENVIRONMENT. REPORT II
Scolnick, M.E., A.C. Scott, and M. Anbar. 1976.
Report USCG-D-37-77, CGR/DC-11/77, Contracts DOT-CG-81-74-1187, DOT-CG-22996-A. 94 p. Final report 26 Jun 72 - 17 May 76.

Source identification, Fuel oil, Petroleum products, Spectrometry, Models, Detection, Statistical analysis

"The identification of oils by field ionization mass spectrometry is reported. Two multivariate data analysis models are described; a parametric statistical model that is based on the assumption of stochastic independence and an empirical model that can be used in a 'learning machine' mode. The results of applying the empirical model to 154 quadrupole spectra and 42 sector magnet spectra are reported."

[from Government Reports Announcements 78(2):#AD-A046 256/4GA. 1978]

C-1246-78
CONTENT AND CRITERIA FOR THE IDENTIFICATION OF NATURAL HYDROCARBONS IN SURFACE WATERS [in Russian]
Semenov, A.D., A.G. Stradomskaya, and L.F. Pavlenko. 1977.
Gidrokhimicheskie Materialy, Vol. 66:96-103.

Source identification, Hydrocarbons, Biogenic hydrocarbons, Seawater, Freshwater, Phytoplankton, Bacteria, *Review

"This review, with 24 references, shows that substantial amounts of hydrocarbons can be produced by phytoplankton and bacteria; concentrations in seawater and fresh water may be ≤ 200 μg/L." [possibly oil pollution related]

[from Chemical Abstracts 89(6):#48538w. 1978]

B. OIL POLLUTION PREVENTION AND CONTROL

1. SPILL CONTAINMENT

C-1247-78
ANTIPOLLUTION FLOATING BARRIER
Schluep, C.A. 1977.
French Patent 2,329,808

Spill containment, Booms, Equipment, Beaches, Hydrocarbons, Patent

The barrier, which contains a hydrophobic absorbing material, "is intended for the protection of beaches and river banks from debris and from hydrocarbon spills."

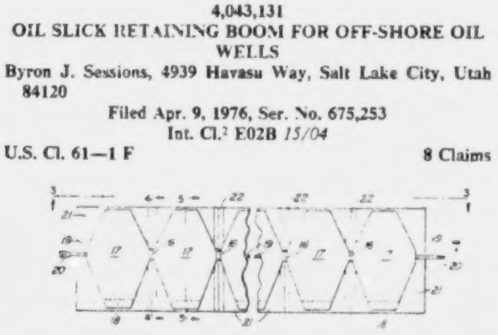
[from Petroleum Abstracts 17(42):#239,535. 1977]

C-1248-78
OIL SLICK RETAINING BOOM FOR OFF-SHORE WELLS
Sessions, B.J. 1977.
US Patent 4,043,131

Spill containment, Booms, Platforms, Patent, Equipment

"A floating barrier for disposition upon a body of water and surrounding an offshore oil well is described."

[from Petroleum Abstracts 17(47):241,041. 1977]



4,043,131
OIL SLICK RETAINING BOOM FOR OFF-SHORE OIL WELLS
Byron J. Sessions, 4939 Havasu Way, Salt Lake City, Utah 84120
Filed Apr. 9, 1976, Ser. No. 675,253
Int. Cl.^{2} E02B *15/04*
U.S. Cl. 61—1 F **8 Claims**

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C-1249-78
FLOATING LOADER FOR A FLEXIBLE ANTIPOLLUTION BARRIER
Soler, C., and G.R. Delamare. 1977.
French Patent 2,324,504

Spill containment, Pollution control, Booms, Patent, Equipment

An invention for deploying an antipollution barrier is described.

[from Petroleum Abstracts 17(39):#238,796. 1977]

C-1250-78
FIELD TRIALS-OPERATION PREPAREDNESS, ST. LAWRENCE RIVER, LISBON BEACH, JUNE 19-23, 1978
Vanderkooy, N. 1978.
Spill Technology Newsletter 3(4):27-42.

Spill containment, Pollution control, Booms, Equipment, Product information, US, Canada, *Field trials

As part of a joint US-Canadian spill preparedness program, field trials of three commercially available containment booms were conducted at Lisbon Beach. The objectives were to: 1) determine any correlation between the present boom evaluation trials and similar trials held in 1974-1975; 2) evaluate barriers not previously included; and 3) develop operational deployment procedures at the Lisbon Beach site. The results of testing the Flexy Standard No. 2 boom, the Guard SUP 75x25 boom, and the ZOOM Series 12 boom are illustrated and discussed.

2. CLEANUP AND REMOVAL

C-1251-78
ARMADILLO SKIRTS: SSACV STRADDLE CARGO TRANSPORTER: SSACV OIL SKIMMER
Anon. 1977.
Hovering Craft & Hydrofoil; The International Review of Air Cushion Vehicles and Hydrofoils 16(7-8).

Equipment, Product information, Skimmers, Spill removal, *SSACV Oil Skimmer, Patent, Design-engineering

The three title products are explained, and their applications are listed. The Semi-Submerged Air Cushion Vehicle (SSACV) Oil Skimmer is a composite vehicle capable of spill removal by two methods: the pressure skimming method and the suction skimming method. Tests on the products are forthcoming and patents are applied for.

[from Oceanic Abstracts 15(2):#78-02054. 1978]

C-1252-78
BAY SKIMMER: CONVENTIONAL HULL OIL SKIMMER WILL SEE DUTY ON IRELAND'S BANTRY BAY
Anon. 1977.
Work Boat 34(8):70-71.

Skimmers, Equipment, Design-engineering, Deepwater ports, Product information, Ireland, *Bay Skimmer

The *Bay Skimmer* is a 68'-long, $1 million vessel designed and engineered by JFB Scientific Corporation, constructed by Blount Marine Corporation, and used by Gulf Oil Corporation, which operates a deepwater port in the title area. Designed to collect oil in 4' seas and make headway in 8' seas, the skimmer collects oil by forcing it under the surface of water, based on the Dynamic Inclined Plane concept.

[from Oceanic Abstracts 15(1):#00627. 1978]

C-1253-78
NEW BOATS
Anon. 1977.
Work Boat 34(7):19,37.

Skimmers, Equipment, Design-engineering, Product information, Spill cleanup, Ireland, *Bantry Bay

The 68 ft *Bay Skimmer* is a custom-built deepwater oil cleanup vessel and is operated by Gulf Oil in Ireland's Bantry Bay. The boat is desgined to also serve as a patrol and fire vessel.

[from Oceanic Abstracts 14(6):#77-05938. 1977]

C-1254-78
PERFECTION OF A SKIMMER FOR RECOVERY OF OIL SPILLS [in Spanish]
Anon. 1977.
Petroleum International 35(9):46.

Spill removal, Equipment, Design-engineering, Skimmers, Product information

A paddlewheel skimmer developed by Lockheed is capable of recovering spilled oil at a rate of 3800 L/min.

[from Petroleum Abstracts 17(48):#241,470. 1977]

C-1255-78
POLLUTION REVIEW
Anon. 1977.
Shipping World and Shipbuilder 170(3925):121,125,127,129,131.

Equipment, Pollution prevention, Spill containment, Spill removal, Design-engineering, Product information

Development of antipollution technology is in three main areas: prevention of discharge of oily water into the ocean, containment, and removal. New prevention devices include an antipollution valve, a vacuum sewage system, and a Bailey Bilge Monitor. New containment equipment includes the Seaboom system for refineries, the Drizit for mopping-up oil spills, the Vikoma Seapack, and the mobile response trailer. Removal developments include the Seaskimmer system, the Mark 4 Skimmer, and the oil spill recovery vessel, Clean Sounder.

[from Oceanic Abstracts 14(5):#77-04751. 1977]

C-1256-78
A REVOLUTIONARY SKIMMER WITH A CATAMARAN HULL
Anon. 1977.
Work Boat 34(7):26-27.

Skimmers, Equipment, Design-engineering, Spill removal, Product information, *Dynamic Oil Skimmer

Developed jointly by Oil Mop Inc. and Lantana Boatyard, Inc., the Dynamic Oil Skimmer is a 38 ft long aluminum catamaran powered by two diesel engines. The skimmer consists of a series of 10 in diameter rope mops in continuous loops between hulls. As the vessel moves through the water, the mops are pulled from the bow where oil is absorbed to the stern where wringers squeeze oil from the mops; the oil collects in a trough on deck. Each mop can pick up >40 bbl/hr, and a total of 250 bbl/hr is possible.

[from Oceanic Abstracts 14(6):#77-05940. 1977]

C-1257-78
NOFI-FENCE AND FRAMO-SKIMMER - THE ONLY EQUIPMENT OF ANY USE DURING THE BRAVO INCIDENT (product information)
Author unknown. 1977.
Scandinavian Oil-Gas Magazine 5(5-6):13-14.

Spill cleanup, Product information, Design-engineering, Equipment, Skimmers, Ekofisk blowout

The title fence and skimmer, of Norwegian design, are described. The skimmer has a capacity of 400 tons per hr and is useful in waves up to 4 m and winds up to 30 knots. These were the only fence and skimmer to function satisfactorily during the Ekofisk Bravo blowout in the North Sea.

[from Petroleum Abstracts 17(38):#238,466. 1977]

C-1258-78
PROCESS AND APPARATUS FOR RECOVERY OF OIL LEAKS
Albano, R.R., and [Obras Maritimas Civil CA]. 1977.
French Patent 2,328,801

Spill removal, Design-engineering, Equipment, Patent

A floating vehicle with rotating collector cylinders, collector wipers, and a storage compartment is designed for the recovery of oil spills.

[from Petroleum Abstracts 17(50):#241,927. 1977]

C-1259-78

COMPOSITION FOR REMOVING PETROLEUM AND PETROLEUM PRODUCTS FROM WATER SURFACES

Antonova, N.M., T.M. Gel'fer, O.S. Mochalova, K.G. Mizuch, et al. 1978.

USSR Patent 596,547

Spill removal, Dispersants, Crude oil, Petroleum products, Patent

The efficiency of removal of crude oil and petroleum products is increased by the addition of 50-90 weight % of N-containing polyethylene polypropylene glycol to a specified dispersant composition.

[from Chemical Abstracts 89(6):#48749r. 1978]

C-1260-78

NEW PROCEDURES FOR THE TOXICITY TESTING OF OIL SLICK DISPERSANTS IN THE UNITED KINGDOM

Blackman, R.A.A., F.L. Franklin, M.G. Norton, and K.W. Wilson. 1978.

Marine Pollution Bulletin 9(9):234-238.

Dispersants, Oil slicks, Toxicity, Analytical techniques, Environmental effects, *Licensing, Spill cleanup, Beach cleanup, UK

The authors present technical descriptions of the different methods used to test dispersants used on the open sea and those applied to oiled beaches. Results of the sea test show that conventional dispersants tend to neutralize or inhibit the toxicity of dispersed oil, whereas concentrates may increase the toxicity. In the beach test mortalities of limpets exposed to crude oil alone range from 67 to 93%; the addition of dispersant leads to a wider range, 22 to 96%. Licensing standards and procedures for dispersant use in the UK under the Dumping at Sea Act 1974 are given.

C-1261-78

DEVICE FOR SUCKING THE UPPER LAYER OF A POLLUTED WATER SURFACE

Chaston-Bagnis, L. 1977.

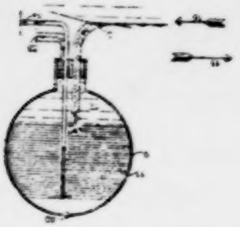
US Patent 4,008,156

Spill removal, Skimmers, Equipment, Design-engineering, Oil-water separation, Patent, *Vacuuming

"A device is described for vacuuming the upper layer of polluted water surfaces... The water and oil in the storage compartment separate by flotation."

[from Petroleum Abstracts 17(45):#240,499. 1977]

4,008,156
DEVICE FOR SUCKING THE UPPER LAYER OF A POLLUTED WATER SURFACE
Lucien Chastan-Bagnis, 21 Avenue Isola Bella, 06400 Cannes, France
Filed July 3, 1975, Ser. No. 592,904
Claims priority, application France, July 4, 1974, 74.24592
Int. Cl.^{2} E02B *15/04*
U.S. Cl. 210—242 R **3 Claims**



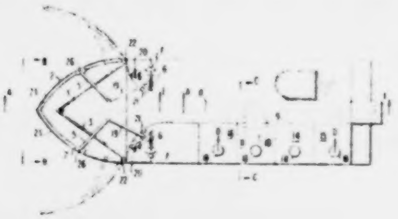
C-1262-78
SPILLED OIL RETRIEVER AND ANTI-WATER POLLUTION WATER CRAFT
Cocjin, D.L, and A.M. Masongsong. 1977.
US Patent 4,033,876

Spill removal, Design-engineering, Skimmers, Oil-water separation, Equipment, Patent

The design of this water craft allows oil to be scooped up from the water surface and deposited into an oil-water separation tank in the rear of the hull.

[from Petroleum Abstracts 17(45):#240,498. 1977]

4,033,876
SPILLED OIL RETRIEVER AND ANTI-WATER POLLUTION WATER CRAFT
Diosdado L. Cocjin, Quezon City, and Artemio M. Masongsong, Manila, both of Philippines, assignors to Diosdado L. Cocjin, Quezon City, Philippines
Filed Feb. 6, 1976, Ser. No. 655,937
Int. Cl.^{2} E02B *15/04*
U.S. Cl. 210—242 S **3 Claims**



C-1263-78
PROCESS AND APPARATUS FOR THE RECOVERY OF SHEETS OF POLLUTING MATERIAL FLOATING ON THE SURFACE OF A BODY OF WATER
Delamare, G.R. 1977.
French Patent 2,324,807

Hydrocarbons, Spill cleanup, Skimmers, Design-engineering, Patent, Equipment

"This apparatus consists of a tank with at least 2 elements carried at the top of a transversal beam. The beam carries on both sides of the tank at least 2 cyclone separators. The apparatus is used to recover hydrocarbons spilled onto the surface of the sea, rivers, and lakes."

[from Petroleum Abstracts 17(39):#238,793. 1977]

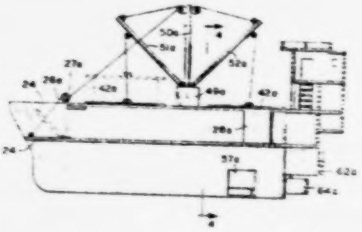
C-1264-78
WATERCRAFT FOR SCAVENGING OIL SPILLAGE
Fletcher, G.M. 1978.
US Patent 3,929,644

Spill removal, Oil-water separation, Skimmers, Patent, Equipment

"A floating vessel with scooping of a surface layer of oil and water, followed by separation within the vessel." [sic]

[from Environmental Technology & Economics No. 16:6. 1978]

3,929,644
WATERCRAFT FOR SCAVENGING OIL SPILLAGE
George M. Fletcher, 456 Lee St., Oakland, Calif. 94610
Filed Dec. 28, 1970, Ser. No. 101,964
Int. Cl.^{2} E02B *15/04*
U.S. Cl. 210—242 **5 Claims**



C-1265-78
DISPERSING AN OIL SPILL
[Imperial Chemical Industries Ltd.]. 1977.
Netherlands Application 76 14,136

Dispersion, Surfactants, Oil spills, Design-engineering, Patent, Equipment

Surface water contaminated by oil is passed through a Venturi-type device in which the pressure is reduced. "The flow velocity of the water is 22.5 225 L/min. The apparatus used comprises a Venturi ejector whose inlet is connected to the water supply, where the outlet has means for spraying the mixture of water and the surfactant. The flow of water and the surfactant is controlled by valves and means for measurement."

[from Chemical Abstracts 88(24):#176768m. 1978]

C-1266-78
PROCESS AND APPARATUS FOR REMOVING POLLUTING SUBSTANCES FROM THE SURFACE OF WATER BY ULTRASONIC MEANS
Koblanski, J.N. 1977.
French Patent 2,324,808

Spill cleanup, Equipment, *Ultrasonic transducer, Patent

An ultrasonic transducer, driven by an A-C source, is maintained below the water surface. The pollutant is forced upward by the ultrasonic waves and is collected before falling back onto the water surface. The method can be applied for oil spill cleanup.

[from Petroleum Abstracts 17(39):#238,790. 1977]

C-1267-78
COMPOUND AND PROCEDURES FOR DISPERSAL OF OIL PRODUCT SPILLS
[Lankro Chemicals Group Ltd.]. 1977.
French Patent 2,330,653

Spill cleanup, Dispersants, Emulsifiers, Patent

A solvent mixture of an emulsifying agent, a diester-type solvent, and an agent which lowers the drop point, is diluted with seawater and used to disperse an oil spill at sea.

[from Petroleum Abstracts 17(50):#241,928. 1977]

C-1268-78
COASTAL OIL POLLUTION
McGee, R. 1977.
Technology Ireland, June 1977:45-46.

Spill cleanup, Booms, Skimmers, Dispersants, Contingency planning, Government agencies, Tankers, Coasts, Ireland

This article provides a brief review of the risks involved in oil transport along the coast, the handling of spilled oil, the methods and equipment employed in spill cleanup, and the agencies responsible for developing and implementing contingency plans in the event of an oil spill off the Irish coast.

C-1269-78
OIL SKIMMER (product information)
[Marine Construction and Design]. 1978.
Environmental Science and Technology 12(12):1334.

Skimmers, Equipment, Safety, Product information

Designed for use in potentially explosive environments, the rotating disc oil-spill skimmer consists of an explosion-proof electric motor-driven hydraulic power unit and pump. Diesel or gasoline hydraulic-powered units, and pneumatic or electrohydraulic powered units are available.

C-1270-78
USE OF MICROORGANISMS IN COMBINATION WITH SURFACE ACTIVE AGENTS TO SYNERGISTICALLY DISPERSE OIL SLICKS
Mohan, R.R., M.L. Robbins, A.I. Laskin, and L.A. Naslund. 1977.
British Patent 1,484,512

Spill cleanup, Dispersants, Microorganisms, Biodegradation, Patent

A chemical dispersant chosen from sorbitan monooleates, polyoxyalkylene adducts of sorbitan monoesters, polyethoxylated fatty acid amides and dialkylsulfosuccinate is used in conjunction with a microorganism for dispersing an oil spill.

[from Petroleum Abstracts 17(50):#241,929. 1977]

C-1271-78
HYDROCARBON SPILL CLEANER (product information)
[Natural Hydrocarbon Elimination Co.]. 1978.
Environmental Science and Technology 12(4):478.

Hydrocarbons, Spill cleanup, Bacteria, Ballast, Biodegradation, Product information, Oil discharges, Seawater, Freshwater

"This biological additive, consisting of strains of hydrocarbon-consuming bacteria, can be used to clean up oil slicks and other hydrocarbon spills in marine or fresh waters. It can also be used as a preventative treatment of bleedwater and overboard discharges from offshore wells or to eliminate hydrocarbons from tanker ballast."

C-1272-78
REMOVING CRUDE OIL, PETROLEUM PRODUCTS, AND THEIR DERIVATIES FROM POTABLE WATER AND SALT WATER
Olivieri, R., A. Robertiello, and L. Degen. 1978.
German Offenlegungsschriften (unexamined patent application) 2,739,428

Freshwater, Seawater, Biodegradation, Spill removal, Patent
*P and N compositions

"Oil spills are removed from natural and salt waters by using compositions containing P and N in a form which can be assimilated easily by petroleum degrading microorganisms, e.g., lecithin, posphatides, hydantoins, ureido derivatives of aldehydes, and amides."

[from Chemical Abstracts 89(2):#11920p. 1978]

C-1273-78
OIL MOP
Rhodes, H.M. 1977.
Canadian Patent 1,011,658

Spill removal, Design-engineering, Equipment, *Oil mop, Patent

An oil mop for the removal of oil from a water surface is described.

[from Petroleum Abstracts 17(46):#240,804. 1977]

C-1274-78
BUZZARDS BAY OIL SPILL - AN ARCTIC ANALOGUE
Ruby, C.H., L.G. Ward, I.A. Fischer, and P.J. Brown. 1977.
International Conference on Port and Ocean Engineering Under Arctic Conditions, 4th, Memorial University of Newfoundland, September 26-30, 1977. Preprint.

Bouchard 65 spill, Spill cleanup, Ice, Fate, Behavior, Fuel oil, Buzzards Bay

The barge Bouchard 65 spilled 81,000 gal of #2 fuel oil into Buzzards Bay, Massachusetts on January 28, 1977. This paper analyzes that spill and the cleanup efforts with special attention to the behavior of oil in a costal area with winter ice cover. Considerations specific to dealing with oil-contaminated ice include slower oil dispersal, potential protection of beach and shore areas, confinement of oil within restricted zones, drift of contaminated ice, secondary pollution when the ice melts, and constrained cleanup methods and effectiveness.

C-1275-78
ABSORBING LIQUIDS
[Serlachius (G A) O/Y]. 1976.
British Patent 1,456,891

Oil slicks, Spill cleanup, Incineration, *Combustion, Patent

A phenolic foamed resin agent is set afire on an oily water surface and acts as a wick by sucking up burning oil and thereby causing complete combustion of the oil.

[from Petroleum Abstracts 17(40):#239,050. 1977]

C-1276-78
OIL SPILL ABSORBENT
Tsushi, H. 1977.
Japanese Kokai (unexamined patent application) 77 72,387

Spill cleanup, Absorption, Patent, *Magnetic sorbent powder

"A powdery absorbent useful for removal of spilled oils from water is made by mixing a porous powder such as sawdust with ferrite, dividing into suitable sizes, and coating with an oleophilic substance such as paraffin." Spilled oil penetrates the paraffin and is absorbed by the sawdust. The ferrite allows the sorbed material to be collected easily by using a strong magnet.

[from Chemical Abstracts 89(2):#11904m. 1978]

3. OIL TRANSFER AND TRANSPORT

C-1277-78
EXXON TECHNIQUE WILL KEEP OIL OUT OF MARINE ENVIRONMENT
Anon. 1977.
Environmental Science and Technology 11(12):1046-1047.

Tankers, Crude oil washing, Ballast, Oil discharges, Oil terminals, Oil transfer, Pollution prevention

Exxon has found that crude oil washing applied to cargo tanks in port reduces the oil residues retained on board ship by at least two-thirds the amount which remains following a conventional water washing. Spraying cargo tanks with a strong jet of crude oil dissolves sludge and clingage (layers of residues on vertical surfaces) which resist water washing. The crude oil washings are pumped ashore along with the rest of the cargo.

C-1278-78
APPARATUS AND METHOD FOR DETECTING, LOCATING, AND OPTIONALLY INDICATING LEAKS IN PIPELINE SEGMENTS
Brandes, B. 1977.
British Patent 1,481,850

Pipelines, Leakage, Detection, Patent

An apparatus is described for detecting, locating, and optionally indicating leaks in electrically conductive pipelines. [possibly oil pollution related]

[from Petroleum Abstracts 17(50):#241,907. 1977]

C-1279-78
STRATEGIC PETROLEUM RESERVE FOR WEEKS ISLAND/COTE BLANCHE MINES
Federal Energy Administration. 1977.
Report FEA/S-77/228, FEA/7677-7-Sup. 258 p. Final environmental impact statement. (Supplement to PB-263 051 and PB-263 075.)

Crude oil, Storage, Oil transfer, Pipelines, Louisiana, FEA, *Strategic Petroleum Reserve

An 89 million bbl crude oil storage facility at the Weeks Island Mine and a 27 million bbl crude oil storage facility at the Cote Blanche Island Mine are being developed. The oil transportation systems proposed in the Final EIS's were revised to provide direct connection by pipeline to the existing oil distribution system at St. James, Louisiana. This supplement deals with the construction and operation of the revised system. [possibly oil pollution related]

[from Government Reports Announcements 78(1):#PB-272 765/9GA. 1978]

C-1280-78
SEA TRANSPORT OF OIL FROM VALDEZ (editorial)
Waldichuk, M. 1978.
Marine Pollution Bulletin 9(9):225-226.

Ports, Pipelines, Pollution prevention, Canada, Washington, *Pacific coast, *Risk analysis, *Trans-Alaska Pipeline

Alternative routes to the world markets for the crude oil delivered through the Trans-Alaska Pipeline to its terminal point, Valdez, on the south coast of Alaska are scrutinized with regard to the risks of oil pollution on the British Columbia coast. The author favorably reviews a Canadian government report Potential Pacific Coast Oil Ports: A Comparative Environmental Risk Analysis (March 1978) which ranks eleven ports on the basis of biological risk, economic risk, and social risk indices.

4. WASTE TREATMENT AND DISPOSAL METHODS

C-1281-78
ANTI-POLLUTION SYSTEM (product information)
Anon. 1977.
Marine Engineers Review, July 1977:37.

Sludge, Incineration, Ships, Product information, Pollution prevention, *EDCO/CITEX system

EDCO GmbH, Hamburg, and the CITEX Gastechnik, Hamburg, have developed and constructed the EDCO/CITEX marine system for preventing pollution, which claims to handle all wastes, solids, galley garbage, and sludge on board ships and kills all bacteria in the sewage water for overboard pumping. The system is composed of a Type CEAK sewage treatment plant and a type CEAV incinerator. The incinerator burns all types of wastes, galley garbage, packing, solids from the sewage treatment plant, and oil sludge.

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #4459-1Q8. 1978]

C-1282-78
A STRONG ATTACK ON THE PROBLEM OF OIL POLLUTION
Anon. 1978.
Environmental Science and Technology 12(4):373.

Oil-water separation, Flotation, Wastewater treatment, Product information, *Asphalt plant, *Ohio River

Use of a dispersed air flotation unit was initiated at Chevron's asphalt plant at Cincinnati, Ohio. Despite the use of an API oil/water separator some oil previously remained in the factory effluent. Now the oil remnant is handled with a polyelectrolyte, which aids coagulation and breaks up emulsions. Flotation is the next step, and the resulting clean water is retained for a minimum of 8 hours before discharge to the Ohio River.

C-1283-78
ANALYSIS OF REFINERY WASTEWATERS FOR THE EPA PRIORITY POLLUTANTS
American Petroleum Institute. 1978.
API Publication 4296. - p.

Wastewaters, Refineries, Contaminants, EPA, API, Sampling, Analytical techniques

"Intake waters, wastewater feed to biotreatment units, and final effluent streams from 17 petroleum refineries were sampled by the EPA within the past year to screen for the presence or absence of the 129 substances on the EPA Priority Pollutant list. Concurrently, an API contractor and/or various individual petroleum companies sampled nine of the 17 refineries.... Although the combined EPA-API data base is limited both in scope and accuracy, it does indicate that many (approximately 65%) of the Priority Pollutants are not present in refinery effluents. In addition, most of the pollutants detected are generally found at extremely low levels and are not uniformly present among refineries sampled nor in replicate samples taken within a single refinery."

C-1284-78

WASTEWATER TREATING AGENTS
Arita, H. 1977.
Japanese Kokai (unexamined patent application) 77 99,647

Wastewater treatment, Absorption, Sorbents, Patent

An inorganic absorbent, fibrous organic matter or its dry distillate, activated carbon or ash, and $CaSO_4$ are used to prepare the treating agent. When 1 L of a suspension of kerosine, soy bean oil, and surfactant was passed through a column containing the agent, the treated effluent was transparent.

[from Chemical Abstracts 88(26):#197191j. 1978]

C-1285-78

INDUSTRIAL PROCESS PROFILES FOR ENVIRONMENTAL USE: CHAPTER 3. PETROLEUM REFINING INDUSTRY
Dickerman, J.C., T.D. Raye, J.D. Colley, and R.H. Parsons. 1977.
Report EPA/600/2-77/023c, Contract EPA-68-02-1319. 148 p. Initial report Aug 75 - Nov 76.

Refineries, Environmental effects, Wastewaters, *Processing, *Catalog

The catalog chapter discusses the title industry in five sections: crude oil separation, light hydrocarbon processing, middle distillate processing, residual hydrocarbon processing, and auxiliary processes. Thirty-two process descriptions include data on input materials, operating parameters, utility requirements, and waste streams. The catalog was produced to aid in defining the environmental impacts of US industries. [possibly oil pollution related]

[from Government Reports Announcements 78(2):#PB-273 649/4GA. 1978]

C-1286-78

SLUDGE SEPARATION
Ito, M., O. Yamamoto, and K. Horiuchi. 1977.
Japanese Kokai (unexamined patent application) 77 49,749

Sludge, Dispersion, Precipitation, Filtration, Patent

Oily sludges are dispersed in water, followed by precipitation and separation of the sludge by filtering, screening, or passing through a packed column.

[from Chemical Abstracts 89(6):#48485b. 1978]

C-1287-78
WASTE WATER PURIFICATION BY FLOTATION
Jobski, H. 1978.
German Offenlegungsschriften (unexamined patent application) 2,652,329

Wastewater treatment, Refineries, Flotation, Equipment, Patent, *Aeration turbine

Refinery wastewaters containing hydrocarbons are treated by air bubble flotation, using an aeration turbine which results in a hydrocarbon separation of 80-90%

[from Chemical Abstracts 89(6):#48529u. 1978]

C-1288-78
PRODUCT, WHICH ACCELERATES THE BIOLOGICAL DEGRADATION OF HYDROCARBONS, IN WHICH CALCIUM LIGNIN SULFONATE DISSOLVES IN WATER AND COMPLEXES WITH A SALT OF A RARE EARTH METAL AND AN ABSORPTIVE SUBSTANCE
Jodehl, A.P. 1977.
Swedish Patent 395,471

Waste oil treatment, Biodegradation, Patent, *Catalyst

Preparation of the title product is described. When added to oil-containing waste, the degradation rate of the oil was doubled.

[from Chemical Abstracts 88(26):#197150v. 1978]

C-1289-78
REMOVAL OF OILS FROM WASTEWATER BY REVERSE OSMOSIS APPARATUS
Kijima, J. 1977.
Japanese Patent 77 43,629

Wastewater treatment, Oil-water separation, *Reverse osmosis, Patent

Degraded membrane modules and membranes used for desalinization are installed in the reverse osmosis apparatus to improve oil removal efficiency.

[from Chemical Abstracts 88(26):#197147z. 1978]

C-1290-78
ULTRAFILTRATION: AN EMERGING UNIT OPERATION
Klinkowski, P.R. 1978.
Chemical Engineering 85(11):164-173.

Waste oil treatment, Ultrafiltration, Emulsions, Wastewaters

A discussion is presented on ultrafiltration and its applications in oil-emulsion waste treatment and other processes.

[from Chemical Abstracts 89(4):#26579h. 1978]

C-1291-78

BREAKING EMULSIONS IN NAVY BILGE COLLECTION AND TREATMENT SYSTEMS
Little, R.C., and R.L. Patterson. 1978.
Environmental Science and Technology 12(5):584-590.

Oil-water separation, Bilges, USN, Wastewater treatment, Emulsions, *Demulsification

In order to conform with new EPA regulations the Navy has radically altered its bilge waste collection and treatment system. Results of the search for a suitable chemical demulsifier to use in conjunction with the new system are reported in detail in this article. Certain quaternary ammonium compounds were effective in breaking oil-in-seawater emulsions.

C-1292-78

ELECTROFLOTATION-COAGULATIONAL PURIFICATION OF OIL EMULSION WASTE WATERS CONTAINING A NONIONIC EMULSIFIER [in Russian]
Men, S.K., T.P. Bondaryuk, T.G. Shelektina, and T.I. Subbota. 1977.
Ochistka Vodnogo i Vozdushnogo Basseinov na Predpriyatiyakh Chernoi Mettallurgi, No. 6:17-20.

Wastewater treatment, Flotation, *Coagulation, Emulsifiers, Oil-water separation

Summary not available.

[from Chemical Abstracts 88(24):#176739d. 1978]

C-1293-78

TREATMENT OF WASTE WATER
Mohri, M., H. Takeda, M. Tsunemi, T. Uchiumi, and T. Kanda. 1978.
German Offenlegungsschriften (unexamined patent application) 2,740,768

Wastewater treatment, *Fluidized beds, Patent

"Wastewater containing oil is degraded in fluidized beds containing active C; the beds also contain porous packing materials to prevent C loss."

[from Chemical Abstracts 88(26):#197178k. 1978]

C-1294-78

PILOT-SCALE STUDIES OF THE LEACHING OF INDUSTRIAL WASTES IN SIMULATED LANDFILLS
Newton, J.R. 1977.
Water Pollution Control (Maidstone, England) 76(4):468-480.

Waste oil, Disposal, *Landfills, Emulsions, Industries, *Leaching, *Pilot study

An aqueous-oil emulsion was one of 3 industrial wastes studied. After 2.5 years, the quantity of oil leached was <2% of that added and the concentration in the leachate did not exceed 30 mg/L.

[from Chemical Abstracts 88(26):#197053r. 1978]

C-1295-78
PETROCHEMICAL EFFLUENTS: THE EUROPEAN EXPERIENCE OF TREATING WASTEWATERS BY BIOLOGICAL TREATMENT SCHEME
Nijst, S.J. 1978.
Environmental Science and Technology 12(6):652-656.

Wastewaters, Petrochemicals, Models, Biological treatment, Cost analysis, Europe

Evaluating treatment methods for effluent from petrochemical plants by the use of models, the Petrochemicals/Ecology Sector Group of CEFIC, the European Council of Chemical Manufacturers' Federations, rated biological treatment highest. Even though the most cost/effective method, it represented 10 to 20% of the annual profits.

C-1296-78
PLANT-SOIL ASSIMILATIVE CAPACITY FOR OILS
Pal, D., and M.R. Overcash. 1978.
AIChE National Meeting, 85th, Philadelphia, Pennsylvania, June 1978. Preprint.

Waste oil, Disposal, Design-engineering, Environmental effects, Vegetation, Soil, *Land application

Research efforts included the evaluation of the practice of oil waste land application, the assessment of performance and design criteria, and the establishment of basic environmental constraints for this process. This paper describes the elements of the land receiver, discusses the processes involved in plant-soil assimilation of petroleum oils, and details the basic design criteria.

C-1297-78
ADSORBENT FOR WASTEWATER TREATMENT
Sato, H., F. Itani, and S. Saiki. 1977.
Japanese Kokai (unexamined patent application) 77,105,653

Wastewater treatment, Oil-water separation, Sorbents, Adsorption, Patent, *Sorbent fibers

"A mixture containing fiber forming acrylonitrile polymer and $Mg(OH)_2$ at (2-10)-fold of the polymer is spun to fibers...to obtain the agent for treating wastewaters....The fibers were packed in a glass column, then 450 ppm turbidity oil-containing wastewater was passed through the column to contain 0 ppm turbidity."

[from Chemical Abstracts 88(26):#197193m. 1978]

C-1298-78
ADSORBENT FOR WASTEWATER TREATMENT
Sato, H., F. Itani, and S. Saiki. 1977.
Japanese Kokai (unexamined patent application) 77,105,654

Wastewater treatment, Oil-water separation, Adsorption, Sorbents, Patent, *Sorbent fibers

"A mixture containing polystyrene [9003-53-6] and MgO at (2-10)-fold of the polystyrene is granulated or extruded to 500-5000μ diameter to obtain an adsorbent for wastewater treatment." Adsorption capacity of the fibers is 0.02 g oil/g fiber.

[from Chemical Abstracts 88(26):#197194n. 1978]

C-1299-78
OIL-CONTAINING WASTEWATER TREATING AGENT
Sato, H., F. Kotani, and H. Uchida. 1977.
Japanese Kokai (unexamined patent application) 77,101,860

Wastewater treatment, Adsorption, Sorbents, Patent

An oil-containing wastewater is treated with an agent containing the inorganic adsorbent $Mg(OH)_2$ and a hydrophilic organic substance such as cellulose. In a test, the adsorption capacity of the material was 0.13 g oil/g adsorbent.

[from Chemical Abstracts 89(2):#11677q. 1978]

C-1300-78
WASTEWATER TREATING AGENT
Sato, H., F. Kotani, and S. Saiki. 1977.
Japanese Kokai (unexamined patent application) 77,101,859

Adsorption, Wastewater treatment, Patent, Sorbents

A granular wastewater treating agent, useful in adsorbing oils and other pollutants, is made from a mixture of MgO and a hydrophilic organic compound, such as cellulose.

[from Chemical Abstracts 89(2):#11676p. 1978]

C-1301-78
SPILL BOOM (product information)
[Slickbar]. 1978.
Environmental Science and Technology 12(10):1214.

Booms, Product information, Equipment

"The spill boom may be used as a permanent barrier in waste ponds, lagoons and at outflows; it is resistant to most hazardous and corrosive materials."

C-1302-78

OIL SPILL: DECISIONS FOR DEBRIS DISPOSAL. VOLUME II. LITERATURE REVIEW AND CASE STUDY REPORTS
Stearns, R.P., D.E. Ross, and R. Morrison. 1977.
Report EPA/600/2-77/153b, Contract EPA-68-03-2200. 166 p. Final report Jun 75 - Aug 76.

Bibliographies, Disposal, Decomposition, Biodegradation, Soils, Environmental effects, *Case studies, *Oil spill debris

A bibliography and summary of current literature concerning oily waste decomposition, migration through soils, and environmental effects are presented. The theoretical limitations on degradation are indicated by calculations. Descriptions and evaluations of effectiveness are also provided for case studies of two sites which used a land cultivation disposal method and of two sites where debris was buried in specially constructed cells.

[from Government Reports Announcements 78(1):#PB-272 953/1GA. 1978]

C-1303-78

REMOVAL OF OILS FROM WASTEWATERS
Uebashi, T., A. Zenno, I. Maruyama, and H. Shiono. 1977.
Japanese Kokai (unexamined patent application) 77,116,646

Wastewater treatment, Oil-water separation, Adsorption, Sorbents, Patent, *Sorbent fibers

"Oil adsorbents for removal of oils from wastewaters are made from coarse linter by mixing with 10-30% thermoplastic synthetic fibers and/or semi synthetic fibers such as ethylene-propylene copolymer or 5-30% natural fibers, and by shaping."

[from Chemical Abstracts 89(6):#48458v. 1978]

C-1304-78

OIL CONTAINING WASTE WATERS AND METHODS FOR THEIR PURIFICATION [in Russian]
Yuzhaninov, A.G. 1977.
Okhrana Prirody i Vod Urala, No. 9:7-13.

Wastewater treatment, Oil-water separation, *Purification

Summary not available.

[from Chemical Abstracts 89(6):#48437n. 1978]

5. OIL-WATER SEPARATION

C-1305-78
AGENT AND METHOD OF PURIFICATION
[Agence Nat Valor Rech]. 1976
British Patent 1,456,985

Oil-water separation, Hydrocarbons, *Purification agent, Patent

Particles of an inorganic solid to which polymer chains have been grafted comprise the purification agent. Hydrocarbons may be removed from polluted water by dispersing the agent in the water or by passing the water through a cartridge in which the agent is housed.

[from Petroleum Abstracts 17(40):#239,051. 1977]

C-1306-78
METHOD AND APPARATUS FOR SEPARATING A MIXTURE
Ballast-Nedam Groep N. V. Skimovex B.V. 1977.
Belgian Patent 848,519

Oil-water separation, Patent, Equipment, *Packed beds

"A procedure is presented for separating 2-phase systems, e.g., water and oil, by 2 packed beds, in which 1 of the beds is being used in the separating stage while the other bed is being washed."

[from Chemical Abstracts 88(26):#193686b. 1978]

C-1307-78
METHOD AND APPARATUS FOR SEPARATING LIQUID/LIQUID DISPERSIONS
Bayley, D.P. and G.A. Davies. 1976.
British Patent 1,445,692

Oil-water separation,*Dispersions, Patent, Equipment

"A method is described of separating the component liquids of a liquid/liquid dispersion containing suspended solids and of which one component liquid is less dense than the other component, e.g., oil and water."

[from Petroleum Abstracts 17(38):#238,468. 1977]

C-1308-78

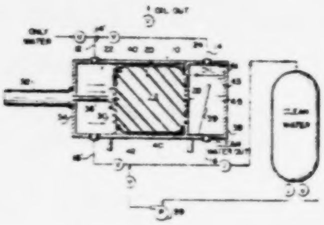
OIL-WATER SEPARATION APPARATUS
Fruman, D.H. 1977.
US Patent 4,022,694

Oil-water separation, Filtration, Patent, Equipment, Design-engineering

A device for the separation of oil and water is described. The separator is a flow-through system containing a foam block filter which can be renewed by squeezing.

[from Petroleum Abstracts 17(38):#238,469. 1977]

4,022,694
OIL-WATER SEPARATION APPARATUS
Daniel H. Fruman, Le Pecq, France, assignor to Hydronautics, Incorporated, Laurel, Md.
Continuation-in-part of Ser. No. 467,466, May 6, 1974, abandoned. This application Dec. 3, 1975, Ser. No. 637,131
Int. Cl.^{2} B01D *29/38*
U.S. Cl. 210—350 **8 Claims**



C-1309-78

SEPARATION SYSTEMS
Gibson, R.R. 1976.
British Patent 1,447,037

Oil-water separation, Spill cleanup, Patent, Equipment

Described is a liquid-surface-layer extraction apparatus for oil spill cleanup. The apparatus floats such that a collection opening is situated at the liquid-liquid interface and conveys away the oil that is entrained and captured by another part of the apparatus.

[from Petroleum Abstracts 17(38):#238,470. 1977]

C-1310-78
COALESCENCE OF OIL IN OIL/WATER EMULSIONS
[Imperial Chemical Industries Ltd.]. 1977.
Australian Patent 484,456

Oil-water separation, Emulsions, Coalescence, Patent, *Silicone-coated fibers

"A method for the removal of oil from an oil-in-water emulsion consists of passing the emulsion through a fibrous structure comprising fibers having finely divided particles of silicone-coated silica which exhibit oleophilic and hydrophobic properties penetrating their outer surfaces and removing coalesced oil droplets so formed."

[from Petroleum Abstracts 17(50):#241,926. 1977]

C-1311-78
OIL ADSORBENT
Kobayashi, Y., R. Matsuo, and M. Nishiyama. 1977.
Japanese Kokai (unexamined patent application) 77,138,081

Oil-water separation, Adsorption, Sorbents, Patent, *Kapok fibers

Kapok fibers used as a mat, block, band, or screen, absorb from 1.5 to 2.0 times as much oil, including emulsions, as polypropylene fibers.

[from Chemical Abstracts 89(2):#11905n. 1978]

C-1312-78
DEGREASING WITH A BUILT-IN CLEANING STAGE
Larrson, R. 1977.
Swedish Patent 393,996

Oil-water separation, Emulsifiers, Solvents, Equipment, Patent

"The metal part is treated 1st with a solvent and an emulsifier, followed by a water wash. The oil removed flows into a separator where it drains out of the system automatically through a water layer. The separator removes oil completely."

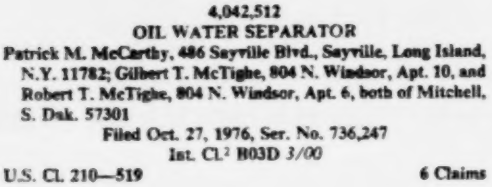
[from Chemical Abstracts 88(24):#172728b. 1978]

C-1313-78
OIL WATER SEPARATOR
McCarthy, P.M., G.T. McTighe, and R.T. McTighe. 1977.
US Patent 4,042,512

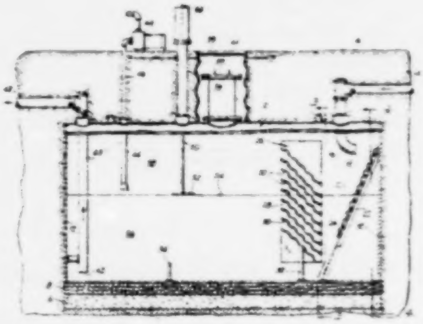
Oil-water separation, Wastewater treatment, Patent, Equipment, Design-engineering

A device for the separation of oil and water is described. The apparatus utilizes sloping baffles and corrugated plates over which the fluid flows.

[from Petroleum Abstracts 17(46): #240,806. 1977]



4,042,512
OIL WATER SEPARATOR
Patrick M. McCarthy, 486 Sayville Blvd., Sayville, Long Island, N.Y. 11782; Gilbert T. McTighe, 804 N. Windsor, Apt. 10, and Robert T. McTighe, 804 N. Windsor, Apt. 6, both of Mitchell, S. Dak. 57301
Filed Oct. 27, 1976, Ser. No. 736,247
Int. Cl.² B03D *3/00*
U.S. Cl. 210—519 **6 Claims**



C-1314-78
OIL-WATER SEPARATOR (product information)
[McTighe Industries]. 1978.
Environmental Science and Technology 12(9):1092.

Oil-water separation, Equipment, Product information

"The unit consists of a separate sludge or separation compartment/area, a main separation chamber and a third chamber through which purified water is discharged to a weir-type outlet."

C-1315-78
COMPARISON OF ASSOCIATIONS OF DIFFERENT HYDROCARBONS WITH CLAY PARTICLES IN SIMULATED SEAWATER
Meyers, P.A., and T.G. Oas. 1978.
Environmental Science and Technology, 12(8):934-937.

Oil-water separation, Hydrocarbons, Adsorption, Seawater, Sedimentation, *Fractionation, Analytical techniques

The title comparison showed identical association behaviors with smectite clay by *n*-eicosane and *n*-eicosene with the association increasing "linearly with increasing hydrocarbon concentration in water. The amount of *n*-alkane associated with smectite increased with carbon chain length from C_{17} to C_{28}, reaching a maximum of 70% removal from water...The level of association of aromatic hydrocarbons was generally low, and isoalkanes were more effectively removed from water than *n*-alkanes of the same number of carbons."

C-1316-78
OPC-3000 COALESCING PLATE OIL/WATER SEPARATOR EVALUATION
Mittleman, J. 1977.
Report NCSL-TM-212-77. 62 p. Technical memorandum.

Oil-water separation, Ballast, Design-engineering, Coalescence, Equipment, USN

The title device for deballasting applications was designed and produced by Naval Coastal Systems Laboratory and is in use at the Craney Island Fuel Depot, Portsmouth, Virginia. Design, system installation, and performance evaluation details are reported.

[from Government Reports Announcements 78(2):#AD-A046 123/6GA. 1978]

C-1317-78
TECHNIQUE FOR REMOVAL OF DISSOLVED AND DISPERSED HYDROCARBONS FROM BIOASSAY EFFLUENTS
Moore, W.S., J.L. Hyland, B.D. Meizian, W. Galloway, and P. Rogerson. 1978.
Environmental Science and Technology 12(5):595-596.

Oil-water separation, Hydrocarbons, Bioassay, Filtration, Wastewaters, *Bioassay effluent, *Sorbent fibers

The authors describe a method for filtering oil-contaminated effluent through polymer-based fibers. This technique efficiently reduces the concentrations of hydrocarbons in the bioassay effluent, discharged at rates from 17 to 26 L/min, from an average of 17 to approximately 1 ppm.

C-1318-78
OIL SEPARATION FROM OIL-WATER EMULSION
Mori, M. 1977.
Japanese Kokai (unexamined patent application) 77,133,881

Oil-water separation, Emulsions, Adsorption, Patent, *Sorbent powder

Water containing emulsified oil is passed through an oil adsorbent powder layer, such a glass bead layer, to collect the oil in a large drop which then automatically rises to the surface for separation.

[from Chemical Abstracts 89(4):#30379k. 1978]

C-1319-78
OIL SEPARATION FROM WATER
Musha, M., T. Sawa, J. Yasui, O. Kato, et al. 1977.
Japanese Kokai (unexamined patent application) 77,111,471

Oil-water separation, Wastewater treatment, Fuel oil, Patent, *Sorbent fibers

"Oil-containing water is passed through fiber layers of thickness 3-100 cm and density 0.10-0.45 g/cm^3, made from hydrophilic single and spun fibers of 10-3000 deniers." In a test, water containing 10,000 ppm fuel oil was passed through the fiber layers, and the treated water contained 2.5 ppm oil.

[from Chemical Abstracts 88(26):#197409m. 1978]

C-1320-78
PLANT FIBER OIL ABSORBENT
Nakarai, W., K. Sato, T. Azuma, K. Ota, et al. 1977.
Japanese Kokai (unexamined patent application) 77,148,493

Oil-water separation, Absorption, Sorbents, Patent, *Plant fiber mats

Plant fibers are mixed with polyolefin fibers or powder, shaped, compacted and sewn into mats, and surface-treated with rubber latex solutions or emulsions.

[from Chemical Abstracts 89(4):#30530c. 1978]

C-1321-78
AGENTS FOR PREVENTING EMULSIFICATION OF CRUDE OIL
Popescu, F., and T.D. Basarabescu. 1976.
Romanian Patent 62,129

Oil-water separation, Emulsions, Patent, Crude oil, *Demulsifiers

"Demulsifiers for crude oil emulsions were prepared by treating glycerol or ethylenediamine with ethylene oxide and propylene oxide at 145° in the presence of alkali catalysts." [possibly oil pollution related]

[from Chemical Abstracts 89(4):#27318j. 1978]

C-1322-78
OIL-COLLECTING MATTE
Saida, T. 1977.
Japanese Kokai (unexamined patent application) 77,149,290

Oil-water separation, Absorption, Sorbents, Patent, *Plant fiber mats

"Plant fiber is dispersed in air, filtered on a moving net, impregnated with aqueous paraffin wax emulsion (1-5%) by either or both of 2 rollers, heated above the melting point of the wax, then impregnated with aqueous rubber latex emulsion (0.5-1%) heated again and cut."

[from Chemical Abstracts 89(4):#30531d. 1978]

C-1323-78
SEPARATING AN EMULSION INTO WATER AND OIL PHASES
Toriya, Y., and T. Koba. 1977.
Japanese Kokai (unexamined patent application) 77,142,666

Oil-water separation, Equipment, Emulsions, Patent, Evaporation, *Condensation

A separatory apparatus is described in which the oil-water emulsion is heated, the vapor generated is collected and condensed, and the condensate is separated into a water phase and an oil phase. The phase separation is enhanced by the condensation process.

[from Chemical Abstracts 89(6):#48492b. 1978]

C-1324-78
BREAKING EMULSIONS WITH RESPECT TO ENVIRONMENTAL PROTECTION [English summary]
Weidel, D., and E. Will. 1977.
Technik und Umweltschutz 17 (Nutz. Ind. Abprod.):95-103.

Oil-water separation, Emulsions, *Review

"A review with 10 references, of emulsion breaking by acids and salts." [possibly oil pollution related]

[from Chemical Abstracts 88(24):#176594c. 1978]

C-1325-78

URETHANE FOAM FOR SEPARATION OF OIL FROM WATER
Yoshida, C., S. Yoshimura, and T. Nagai. 1978.
Japanese Kokai (unexamined patent application) 78 42,191

Oil-water separation, Absorption, Sorbents, Patent, *Urethane foam

"Homogeneous oleophilic soft urethane foams are prepared from an oleophilic polyol (I) (or a polyol containing (I) as a main component), polyisocyanate, catalyst, and crosslinking and foaming agents (containing no silicon) and are compressed 1.5- to 4-fold to make a column" with specified shape factor and bulk density.

[from Chemical Abstracts 89(4):#25811r. 1978]

C-1326-78

OIL ABSORBENT
Zenno, A., T. Uebayashi, I. Maruyama, and H. Shiono. 1977.
Japanese Kokai (unexamined patent application) 77 69,884

Oil-water separation, Absorption, Sorbents, Patent, *Sorbent mats

"Crude linters, optionally with synthetic thermoplastic and/or half/synthetic polymer 10-30% as binder, are formed into mats for oil removal from water."

[from Chemical Abstracts 89(2):#11666k. 1978]

6. RECLAMATION AND REUSE

C-1327-78

WASTES FROM PETROLEUM REFINERIES AND PETROCHEMICAL PLANTS [in Japanese]
Iijima, T. 1978.
Kagaku No Ryoiki. 32(1):58-73.

Waste oil, Wastewaters, Refineries, Petrochemicals, Reclamation, Reuse

"Wastes produced from petroleum refineries and petrochemical plants were investigated and the possibility and conditions for their reuse were discussed."

[from Chemical Abstracts 89(4):#30315m. 1978]

C-1328-78
INSTANTANEOUS EVAPORATOR
Iwamoto, T. 1977.
Japanese Kokai (unexamined patent application) 77,139,674

Waste oils, Reclamation, Reuse, Evaporation, Distillation, Equipment, Patent

Waste oils are heated in the bottom of a vessel which forms an oil bed; in this manner the low boiling point light oils are distilled and reclaimed, the water is boiled off, and hard sludges are deposited.

[from Chemical Abstracts 89(6):#48480w. 1978]

C-1329-78
OIL SKIMMER/COLLECTOR (product information)
[Pollution Control Engineering]. 1978.
Environmental Science and Technology 12(8):971.

Reclamation, Spill removal, Skimmers, Product information, Equipment

"The semi-portable skimmer is designed for use in reclaiming oils of differing viscosities. It is suitable for applications where the need for oil collection is less than 1200 gal/day."

C-1330-78
LUBRICATING OIL FROM USED WASTE LUBRICATING OIL
Whisman, M.L., J.W. Reynolds, J.W. Goetzinger, and F.O. Cotton. 1978.
US Patent 4,073,719

Waste oil, Lubricating oil, Reclamation, Patent, *Regeneration, *Vacuum stripping

Used lubricating oils can be regenerated by "stripping in vacuo, solution in BuOH, 2-propanol, and MeCOEt, removal of resulting sludge, fractional distillation in vacuo, and decolorization and deodorization by contact with Filtrol bleaching clay."

[from Chemical Abstracts 89(2):#8697r. 1978]

C-1331-78
RECLAIMING WASTE LUBRICATING OILS
Whisman, M.L., J.W. Goetzinger, and F.O. Cotton. 1978.
US Patent 4,073,720

Reclamation, Waste oil, Lubricating oil, Solvents, Patent, Distillation, *Vacuum stripping

"A used lubricating oil was regenerated by stripping in vacuo, solution in BuOH 2, 2-propanol 1, and MeCOEt 1 part, removal of the resulting sludge and fractional distillation in vacuo. Three parts of solvent mixture were used for each part of stripped oil."

[from Chemical Abstracts 89(2):#8696q. 1978]

7. PERSONNEL TRAINING AND EDUCATION

C-1332-78
WEAPONS AGAINST OIL POLLUTION
Anon. 1977.
Dock and Harbor Authority 58(680):114-116.

Personnel training, Dispersants, IMCO, Manuals, Booms, Skimmers, Sinking agents, Sorbents, Spill cleanup

Published by the IMCO, the Manual on Oil Pollution outlines basic principles for avoiding pollution, including personnel duties and requirements. The use and various methods of application of dispersants are explained. Oil booms and skimmers, mechanical techniques for controlling spills, sinking agents, and absorbents are also described.

[from Oceanic Abstracts 15(2):#78-02053. 1978]

C-1333-78
"RED RIVER RUN" - A SPILL PREPAREDNESS EXERCISE IN MANITOBA
Mansfield, B.H. 1978.
Spill Technology Newsletter 3(4):44-49.

Personnel training, Contingency planning, Pollution control, Canada, Oil industry, *Field exercise

A one-day field exercise for oil spill preparedness was held in September 1978 near Winnepeg, Manitoba, as part of a cooperative federal/provincial/industry exercise of reporting and communications arrangements, available spill equipment, and of designated industry, contractor, and government personnel. This article describes planning and participation, the spill simulation and response activities, the site, scenario, and field operations, and the results and recommendations.

8. CONTINGENCY PLANNING

C-1334-78
ANTI-OIL POLLUTION POST (news brief)
Anon. 1978.
Marine Pollution Bulletin 9(9):227-228.

Contingency planning, Pollution prevention, Spill cleanup, Government agencies, England

Based on recommendations made in a British government report on the Amoco Cadiz and Eleni V disasters, a new Contingencies Planning and Operations Unit will be established by fall 1978. Both preventive measures and a greater efficiency of communications and operations in case of oil spills will be stressed.

C-1335-78
ARABIAN GULF ACTION PLAN (news brief)
Anon. 1978.
Marine Pollution Bulletin 9(7):171.

Contingency planning, Pollution control, Monitoring, *Persian Gulf, *Action Plan

A $6 million trust fund will finance an Action Plan to protect the Arabian coastline. The area is a high pollution risk because 60% of the world's oil shipments pass through the Gulf. Included in the Action Plan are contingency plans for a marine emergency center in Bahrain.

C-1336-78
HOW TO WRITE SPCC PLANS FOR ALASKA LAND RIGS
Willits, K.L. 1977.
Petroleum Engineering 49(10):100, 102.

Contingency planning, US, Regulations, Pollution prevention, Pollution control, Oil wells, Inland, Alaska

US regulations prohibiting the discharge of oil into federal waters contain broad enough definitions as to extend to land spills in the Alaskan wilderness. To comply with these regulations, land rig operators must therefore maintain valid spill prevention, control and countermeasure (SPCC) plans in order to avoid a $5000/day penalty for each day of operation without such a plan. The format of and information included in the plan are described.

[from Petroleum Abstracts 17(52):#242,524. 1977]

9. PREVENTION AND CONTROL MEASURES

C-1337-78
OFFSHORE SAFETY AND ITS COST TO UNDERWRITERS
Anon. 1977.
Shipping World and Shipbuilder 170(3930):511.

Liability, Safety, Insurance, Offshore development, Compensation, Pollution control

The Ekofisk Field blowout, the Bravo rig accident, and 2 onshore calamities in the Middle East renewed calls for action on substandard ships. The Carter administrations's moves against offshore spills spurred a reevaluation of safety and availability of facilities to combat pollution. Britain, Norway, and the Netherlands signed an offshore pollution liability convention, subject to ratification, which provides that North Sea and other European oil operators will be liable to pay up to $35 million compensation/pollution incident and must insure themselves for $25 million to meet possible claims.

[from Oceanic Abstracts 15(2):#78-02240. 1978]

C-1338-78
SMALL STEPS TOWARD A CLEANER MEDITERRANEAN
Anon. 1978.
New Scientist 77(1086):141.

Pollution control, Environmental protection, Economics, Mediterranean Sea, *Treaty, *Standards

A Mediterranean pollution treaty may be ready for signing in 1979. The draft treaty will be a crucial step towards controlling Mediterranean pollution, as nearly 80% of it is land-based. The total bill to implement the treaty may reach US $10 billion, most of which would be paid by the higher polluting northern states. A system of common environmental standards is being approached which would allow emission standards to vary from nation to nation, depending upon the receiving capacity of the local sea. [possibly oil pollution related]

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): 4440-1Q8. 1978]

C-1339-78
IMPROVEMENTS IN OR RELATING TO THE PREVENTION OF POLLUTION BY LEAKAGE FROM A STORAGE TANK
Andersen, L.J. 1977.
British Patent 1,485,716

Storage, Pollution prevention, Leakage, Patent

An impermeable wall surrounds the storage tank and extends below the water table level into the ground underneath the tank. A pump creates a vacuum in the ground between the wall and the tank and carries away any leakage from the tank.

[from Petroleum Abstracts 17(52):#242,715. 1977]

C-1340-78
MARINE POLLUTION TIMETABLE
Bartlett, T. 1977.
Dock and Harbour Authority 58(680):108-110.

Pollution prevention, International agreements, International conventions, Regulations, Tankers, Safety

The history and the current status of efforts to form international agreements on pollution prevention are presented. In 1886 the first modern oil tanker was launched, and in 1926 the first international pollution conference established zones where no oil should be discharged. Since then, oily discharges have been further regulated, tanker size limits have been established, and compensation funds for oil-damaged victims have been created. Tanker safety technologies are currently proposed.

[from Oceanic Abstracts 15(2):#78-02051. 1978]

C-1341-78
MEDITERRANEAN COUNTRIES COME CLEAN
Bugler, J. 1978.
New Scientist 77(1084):4.

Pollution control, Legislation, Monitoring, Environmental management, Mediterranean Sea, UN, *UNEP

Delegates from the governments of nearly all the Mediterranean countries met in Monaco, January 9-14, 1978, to review the Mediterranean Action Plan. The UN Environmental Programme (UNEP) administers the plan as one part of an eight-sea program to stop the deterioration of the seas. The Action Plan covers legislation, monitoring and research, and the management of future growth for the Mediterranean, where pollution problems are increasing. [possibly oil pollution related]

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #4439-1Q8. 1978]

C-1342-78

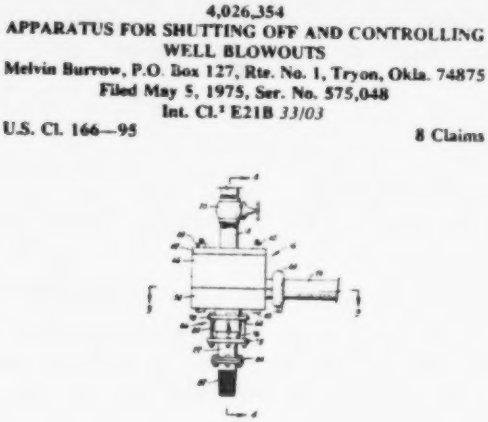
APPARATUS FOR SHUTTING OFF AND CONTROLLING WELL BLOWOUTS

Burrow, M. 1977.
US Patent 4,026,354

Blowouts, Pollution control, Patent, Equipment, Design-engineering

A device for the control of well blowouts is described. The apparatus is designed to be temporarily attached to the top of a conduit string in a well bore after a blowout has occurred.

[from Petroleum Abstracts 17(36):#238,402. 1977]



4,026,354
APPARATUS FOR SHUTTING OFF AND CONTROLLING WELL BLOWOUTS
Melvin Burrow, P.O. Box 127, Rte. No. 1, Tryon, Okla. 74875
Filed May 5, 1975, Ser. No. 575,048
Int. Cl.^{2} E21B *33/03*
U.S. Cl. 166—95 **8 Claims**

C-1343-78

OIL POLLUTION CONTROL EQUIPMENT IN FRANCE

de Castro, G. 1977.
Ship & Boat International 30(9):39-40.

Equipment, Pollution control, France, Oil-water separation, Skimmers, Sorbents, Sinking agents, Oil discharges, Detection, Product information

Three products manufactured by Nemo International are described: the Vortex oil drinker intended for use in enclosed areas, the Cyclonet which removes surface oil and separates it by a hydrocyclone effect, and towed tanks. Omya Company manufactures Nautex Hydrophobe, a non-toxic product which uses chalk and a hydrophobe to absorb hydrocarbons. The Societe Anonyme de Telecommunications manufactures the French teledetection system which is designed to protect against illegal oil discharging.

[from Oceanic Abstracts 15(2):#78-02063. 1978]

C-1344-78
BLOWOUT (AND OIL SPILL) PREVENTIVE REGULATIONS
El-Defrawy, M.K. 1978.
Spill Technology Newsletter 3(4):19-20.

Blowout prevention, Drilling, Inland, Regulations, Government agencies, Pollution prevention, Contingency planning, Canada

New Canadian oil and gas drilling regulations, soon to be promulgated, will require submittal of an Oil Spill Contingency Plan, as well as a Blowout and Major Rig Fire Contingency Plan to the responsible federal authorities, before any drilling program can be undertaken on Canada's federal lands. In addition to requiring adequate corrective measures, the new regulations also call for a number of preventive measures, designed to prevent well blowouts below- and above-ground.

C-1345-78
PIPELINE LEAK DETECTOR WITH BAFFLES
Fechter, H.R., and G.B. Walker. 1977.
US Patent 4,020,674

Pipelines, Leakage, Detection, Equipment, Design-engineering, Patent

The apparatus contains a differential pressure measuring device that senses reduced pressure at the point of a leak as it is propelled through the pipe. The location of the leak is simultaneously recorded.

[from Petroleum Abstracts 17(36):#237,974. 1977]

C-1346-78
ADMINISTRATIVE AND LEGAL ASPECTS OF WASTE DISPOSAL
Small, W.R. 1977.
Chemistry and Industry (London), Vol. 14:600-605. (Annual meeting of the Society of Chemical Industry, Southampton, UK, 14 July 1977.)

Pollution control, Monitoring, Surveillance, UK, Europe, Foreign governments

The following concerns of the Ministry of Agriculture, Fisheries, and Food (MAFF) are described: measures to aid in controlling marine pollution, the basis upon which control procedures have been established, methods of surveying and monitoring the environment, the responsibilities of the MAFF, and the role of the MAFF in European pollution monitoring schemes.

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #4589-1Q8. 1978]

C. ASPECTS OF OIL POLLUTION

1. BIOLOGICAL ASPECTS

C-1347-78
HAZARDS REMAIN AFTER OIL SPILL CLEANUP
Anon. 1977.
World Dredging 13(12):39.

Hydrocarbons, Toxicity, Oil spills, Estuaries, *Photo-oxidation

A. Scheier of the Academy of Natural Sciences exposed various aquatic organisms to water taken from beneath simulated oil spills as part of a study on the impact of oil on the Delaware Estuary. It was found that photo-oxidation reactions transform hydrocarbons into soluble toxic peroxides, phenols, and acids. The most toxic effects appeared after 24 hr and remained throughout the experiment. Certain crude oils containing sulphur compounds may not be as toxic as others.

[from Aquatic Sciences and Fisheries Abstract, Part 1, 8(4): #4484-1Q8. 1978]

C-1348-78
CRUDE OIL IN THE DIET HAS LITTLE EFFECT ON TROUT REPRODUCTION
Author unknown. 1977.
NOAA Science and Engineering News Report, No. SEN-70. 13 p.

Toxicity, Fish, Reproduction, Crude oil, Biological effects, *Rainbow trout

Fertility in adult male rainbow trout was found not to be affected after fish received food coated with Prudhoe Bay crude oil. Survival through hatching was 86% for test eggs and 90% for controls and from hatching to the swim-up fry stage was 76% for test lots and 91% for controls, "a statistically non-significant difference." Reproduction in fish was concluded to be unimpaired after exposure to large amounts of crude oil in the diet based on the results of this study.

[from Petroleum Abstracts 17(48):#241,475. 1977]

C-1349-78
FISH ACCUMULATE BENZENE AND TOLUENE - WATER-SOLUBLE COMPONENTS OF CRUDE OIL - AFTER BRIEF CONTACT
Author unknown. 1977.
US Department of Commerce News Announcements, No. SEN-68. 7 p.

WSF, Biological effects, Chronic effects, Fish, Uptake, Crude oil, Aromatic hydrocarbons, *Benzene, *Toluene

"Chronic exposure to low levels of petroleum hydrocarbons are probably more harmful to fish than are spills and blowouts. A recent study in which the uptake and persistence of benzene and toluene (the two most prevalent components of crude oil) in Pacific herring were examined indicates that toluene poses the greater threat. It can rapidly accumulate to high levels in fish even after a relatively brief contact."

[from Petroleum Abstracts 17(45):#240,497. 1977]

C-1350-78

THE EFFECTS OF PETROLEUM ON DIFFERENT STAGES OF INCUBATION IN BIRD EGGS
Albers, P.H. 1978.
Bulletin of Environmental Contamination and Toxicology 19(5):624-630.

Birds, Fuel oil, Crude oil, Toxicity, Biological effects, *Hatchability, *Incubation stages

Two experiments were conducted on the effects of No. 2 fuel oil and Southern Louisiana crude oil applied to the surface of domestic mallard eggs in 5 μL quantities. Hatchability of these eggs decreased as the age of the embryo at treatment decreased, embryos being most sensitive during the first 10 days of incubation. Southern Louisiana crude oil had a more toxic effect than the No. 2 fuel oil.

C-1351-78

THE EFFECTS OF CRUDE OIL AND THE DISPERSANT, OILSPERSE 43, ON RESPIRATION AND COUGHING RATES IN ATLANTIC SALMON (SALMO SALAR)
Barnett, J., and D. Toews. 1978.
Canadian Journal of Zoology 56(2):307-310.

Crude oil, Emulsions, Dispersants, Metabolism, Fish, Sublethal effects, Toxicity, Weathering, *Salmo salar

Emulsions of unweathered and weathered Venezuelan crude oil and the dispersant Oilsperse 43 increased the coughing rate of post-smolt Atlantic salmon in fresh water at 0.01-0.7 toxic units in 12-hr tests. "Coughing rates increased on a concentration- and time-related basis, while respiration rates declined at the higher sublethal levels. At most concentrations tested, there were no differences between the physiological responses in either unweathered or artificially weathered emulsions."

[from Chemical Abstracts 89(1):#1200q. 1978]

C-1352-78

TOXIC EFFECT OF WATER-SOLUBLE FRACTIONS OF CRUDE, REFINED, AND WEATHERED OILS ON THE GROWTH OF A MARINE BACTERIUM

Calder, J.A., and L.F. Griffin. 1977.
Applied and Environmental Microbiology 33(5):1092-1096.

Bacteria, Toxicity, WSF, Crude oil, *Refined oils, *Weathered oils

WSF's of crude and refined oil samples reduced the growth rate and the maximum cell density of *Serratia marinorubra* grown in batch culture. WSFs of laboratory weathered crude and refined oils were more toxic to *S. marinorubra* than the parent unweathered oils. Toxicity did not correlate with the concentration of total WSF or of aromatic hydrocarbons in the WSF.

[from Oceanic Abstracts 15(1):#00602. 1978]

C-1353-78

ECOLOGICAL STUDIES OF THE COASTAL ZONE AFFECTED BY POLLUTION FROM THE 'NORTHERN BREEZE'. 1. GENERAL INTRODUCTION AND BEACH COMMUNITIES AT ARENA [English summary]

Castilla, J.C., M. Sanchez, and O. Mena. 1977.
Medio Ambiente 2(2):53-64.

Invertebrates, Beaches, Shorelines, Oil spills, Biological effects, Chile, **Northern Breeze* spill

Presented are the results of an ecological survey of a part of Chilean sandy beaches affected by the oil spillage of the Liberian merchant ship *Northern Breeze* at Farellones de Quintero, September 15, 1975. At the time of the study, October 4-7, 1975, about 200 tons of petroleum had spilled and affected ~46 km of coastal zone, 1/2 of which were sandy beaches already covered by 7.1 tons, and 1/2 rocky shores. Sandy beach invertebrate macro-fauna studies showed changes in the typical vertical zonation patterns of some invertebrates, "lowered specific diversity," and probable lethal effect on the "smaller individuals of the most typical invertebrates (i.e., *Emerita analoga*)."

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #4489-1Q8. 1978]

C-1354-78

HISTOPATHOLOGICAL AND PHYSIOLOGICAL RESPONSES OF *FUNDULUS HETEROCLITUS* TO NAPHTHALENE EXPOSURE
DiMichelle, L., and M.H. Taylor. 1978.
Journal of the Fisheries Research Board of Canada 35(8):1060-1066.

Toxicity, Biological effects, Fish, Aromatic hydrocarbons, Uptake, *Naphthalene, **Fundulus heteroclitus*

Exposure of the title organism to concentrations of naphthalene as low as 0.2 mg/L for 15 days resulted in major effects on the brain, liver, and pancreas, and in evidence of neurosensory damage and metabolic stress. At two concentrations, ^{14}C-naphthalene accumulated "in significant amounts in organs most susceptible to pathology."

C-1355-78

FATE OF ^{14}C-BENZENE IN EGGS AND LARVAE OF PACIFIC HERRING (*CLUPEA HARENGUS PALLASI*)
Eldridge, M.B., T. Echeverria, and S. Korn. 1978.
Journal of the Fisheries Research Board of Canada 35(6):861-865.

Fish, Uptake, Aromatic hydrocarbons, Biological effects, Food web, **Clupea harengus pallasi*, *Benzene, *Biomagnification

Under experimental conditions, accumulation of benzene, a relatively abundant and soluble aromatic component of crude oil, in the tissue of the title organism was inversely related to age: "eggs accumulated up to 10.9 times the initial concentration, yolk-sac larvae up to 6.9 times, and feeding larvae to 3.9 times." The authors also determined that biomagnification of petroleum-based hydrocarbons occurs, stating that certain types of "zooplankters...do accumulate hydrocarbons to amounts in excess of the exposure concentrations... and provide a pathway that may be more significant than through the water."

C-1356-78

DIRECT MORTALITY AND RELATED FACTORS AFFECTING WATERFOWL IN NORTH AMERICA
Linduska, J.P., and H.M. Reeves. 1976.
International Conference on Conservation of Wetlands and Waterfowl, Heiligenhafen, Federal Republic of Germany, 2-6 December 1974.
M. Smart (ed.). Slimbridge, England, International Waterfowl Research Bureau, 1976. p. 437-443.

Birds, Mortality, Sublethal effects, Acute effects, Contamination, Habitats, *Waterfowl

The title topic includes references to the impact of oil on waterfowl. The authors mention the risk of offshore oil exploration and production to estuarine and coastal waterfowl habitats, the cessation of egg laying from hens ingesting oil due to preening oil-contaminated feathers, the reduced hatchability of duck eggs as a result of oil coating the eggs, and the direct loss of waterfowl from oil spills.

C-1357-78
THE ACUTE EFFECT OF BUNKER C OIL AND AN OIL DISPERSANT ON SERUM GLUCOSE, SERUM SODIUM AND GILL MORPHOLOGY IN BOTH FRESHWATER AND SEAWATER ACCLIMATED RAINBOW TROUT (*SALMO GAIRDNERI*)
McKeown, B.A., and G.L. March, 1978.
Water Research 12(3):157-163.

Crude oil, Dispersants, Fish, Acute effects, ***Salmo gairdneri*, *Serum glucose and sodium, *Gill morphology

In the title study, both compounds tended to decrease serum glucose levels with Bunker C causing the more significant decrease and indicating possible dysfunction of the kidney. Freshwater trout showed a decrease in Na levels, and saltwater-acclimated fish showed a marked increase in Na levels when treated with a dispersant. Gill tissues showed severe damage caused by dispersant and oil/dispersant mixtures; Bunker C exposure alone caused less damage to these tissues.

[from Chemical Abstracts 89(5):#37643a. 1978]

C-1358-78
BIOLOGICAL CONSEQUENCES OF OIL SPILLS
Nelson-Smith, A. 1977.
Environment and Man, Volume 5. The Marine Environment. J. Lenihan and W.W. Fletcher (eds.). New York, Academic Press, 1977. p. 46-69.

Biological effects, Environmental effects, Oil spills, Birds, Fish

Offshore oil production and transportion of greater quantities of oil have led to increases in oil pollution over the past 50 years. Approximately 2 million tons of oil enter the ocean environment annually. Marine birds tend to be severely affected, while fish in general can avoid the consequences. Harmful effects on plants, shellfish, and mammals vary in intensity.

C-1359-78
EXPOSURE OF MARINE BIRDS TO ENVIRONMENTAL POLLUTANTS
Ohlendorf, H.M., R.W. Risebrough, and K. Vermeer. 1978.
Washington, DC, US Department of the Interior, Fish and Wildlife Service, 1978. 40 p. (Wildlife Research Report 9)

Birds, Contamination, Hydrocarbons, Mortality, Toxicity, Surfactants, Sources, Fate, *Review

The effects of petroleum hydrocarbons, organochlorides, heavy metals, and other contaminants on marine birds are reviewed. Adverse effects of oil pollution include mortality due to oiled feathers, death by dehydration after ingestion of oil, toxic effects of surfactants, and death or poisoning of the birds' food supply. Sources of oil in US waters and the transfer and dissipation of oil at sea are also discussed. Comprehensive references are provided.

C-1360-78

TOXICITY OF POLYNUCLEAR AROMATIC HYDROCARBONS TO THE POLYCHAETE NEANTHES ARENACEODENTATA

Rossi, S.S., and J.M. Neff. 1978.
Marine Pollution Bulletin 9(8):220-223.

Bioassay, Polychaetes, Aromatic hydrocarbons, Solubility, *PNA, *Neanthes arenaceodentata, Toxicity

The toxicity of ten polynuclear aromatic hydrocarbons (PNAs) to the title organism, a sediment-dwelling marine worm, was investigated. Replicate 96 hr bioassays were performed with specific hydrocarbons in solution. Toxicity of PNA appears to be related to both solubility and residence time in test solutions.

C-1361-78

THE ACCUMULATION OF LOW MOLECULAR WEIGHT AROMATIC HYDROCARBONS OF CRUDE OIL BY COHO SALMON (ONCORHYNCHUS KISUTCH) AND STARRY FLOUNDER (PLATICHTYS STELLATUS)

Roubal, W.T., S.I. Stranahan, and D.C. Malins. 1978.
Archives of Environmental Contamination and Toxicology 7(2):237-244.

Fish, WSF, Crude oil, Accumulation, Aromatic hydrocarbons, *Oncorhynchus kisutch, *Platichtys stellatus

The title organisms were exposed for two weeks to 0.9 ppm of a water soluble fraction (WSF) of Prudhoe Bay crude oil in flowing seawater. Both species accumulated a complex spectrum of low-molecular weight hydrocarbons, but in flounder the bioconcentration factor in muscle tissue was significantly higher (17 ppm) than in salmon (1.5 ppm). Complex mixtures of hydrocarbons were present in liver and gill tissues of both species, and substantial variations were found in the bioconcentration factors for individual hydrocarbons in both species.

[from Chemical Abstracts 89(5):#37619x. 1978]

C-1362-78
ECOLOGICAL STUDIES OF THE COASTAL ZONE AFFECTED BY POLLUTION FROM THE 'NORTHERN BREEZE'. 2. COMMUNITIES OF ROCKY BEACHES [English summary]
Santelices, B., J. Cancino, S. Montalva, R. Pinto, and E. Gonzales. 1977.
Medio Ambiente 2(2):65-83.

Habitats, Biological effects, Intertidal zone, Marine organisms, Oil spills, Chile, *Northern Breeze spill

The ecological destruction caused by the Northern Breeze spill, September 15, 1975, was studied in two habitats near Caleta Horcon, central Chile. The habitats differ in wave exposure and substratum slope, but at both habitats the maximum cover, biomass per unit area, stratification, and diversity (number of sp.) were found at the lower levels of the beach. About 1-2% of the intertidal rocks were contaminated by the oil spill, affecting the upper intertidal organisms (e.g. Chthamalus cirratus and Porphyra columbina). "The quantitative description of intertidal communities reported here [is] the first along the Pacific South American coast."

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #4564-1Q8. 1978]

C-1363-78
PLANKTON PROCESSES IN MID-ATLANTIC NEARSHORE AND SHELF WATERS AND ENERGY-RELATED ACTIVITIES
Smayda, T.J. 1976.
Effects of Energy-Related Activities on the Atlantic Continental Shelf Conference, Upton, NY, 10-12 November 1975. p. 70-95.

Biological effects, Plankton, Offshore development, Hydrocarbons, Fate, Atlantic Ocean

Petroleum hydrocarbons, as well as other compounds, may be released into the sea as a result of energy-related activities in the Atlantic. The impact of these on plankton will depend upon the natural processes occurring in the area of release.

[from Petroleum Abstracts 17(43):239,710. 1977]

C-1364-78
LABORATORY RESEARCH ON SEA-BIRDS: REPORT ON A PRACTICAL INVESTIGATION INTO THE POSSIBILITY OF KEEPING SEA-BIRDS FOR RESEARCH PURPOSES
Swennen, C. 1977.
Texel, Netherlands, Netherlands Institute for Sea Research, 1977. 45 p.

Birds, Mortality, *Oiled birds, *Successful rearing, *Captivity

Successful rearing of seabirds in captivity requires maintaining water surface quality and surface tension measurements similar to natural environmental conditions. Attention to the condition of feathers of captive seabirds is important as they lose their water repellency; seabirds succumb to exposure and exhaustion when losing their buoyancy. Rehabilitated oiled seabirds had a five times greater mortality rate following recovery than birds raised from chicks under the same conditions.

[from Oceanic Abstracts 14(5):#77-04404. 1977]

C-1365-78
THE TOXICITY OF OILS AND PETROLEUM HYDROCARBONS TO ESTUARINE CRUSTACEANS
Tatem, H.E., B.A. Cox, and J.W. Anderson. 1978.
Estuarine and Coastal Marine Science 6(4):365-373.

Biological effects, Hydrocarbons, Aromatic hydrocarbons, Crustaceans, Bioassay, Toxicity, Metabolism, *Estuarine shrimp

Bioassay experiments with various life stages of 3 estuarine shrimp species and soluble petroleum hydrocarbons revealed that Bunker C oil and refined No. 2 fuel oil were more toxic than 2 crude oils tested. Shrimp exposed to the petroleum hydrocarbons in conjunction with salinity and temperature changes were more susceptible to the hydrocarbons. Of the hydrocarbons utilized in the bioassay, the naphthalenes were most highly toxic, and the toxicity of petroleum products is closely related to the aromatic hydrocarbons content, especially that of naphthalenes and related types.

[from Chemical Abstracts 89(4):#18005c. 1978]

2. PHYSICAL/CHEMICAL ASPECTS

C-1366-78
EVAPORATION OF PETROLEUM OIL FILMS (2ND REPORT); EFFECTS OF MOLECULAR WEIGHT DISTRIBUTION OF OILS ON EVAPORATION [in Japanese]
Hirano, F., T. Sakai, and N. Yamagata. 1977.
Junkatsu 22(11):726-733.

Spreading, Evaporation, Behavior, *Oil films

Spreading and evaporation characteristics of two base oils and various base oil mixtures of differing molecular weight distributions were studied on a horizontal heating surface. Minimum and maximum evaporation times of the blended oils differed from those of the base oils.

The spreading film diameters were increased in the blended oils due to evaporation of the low molecular weight components, and patterns of the blended oil spreading films were very complex. [possibly oil pollution related]

[from Chemical Abstracts 88(24):173182f. 1978]

C-1367-78
REVIEW OF OIL SPREADING ON THE SEA
Hoult, D.P. 1976.
Effects of Energy-Related Activities on the Atlantic Continental Shelf Conference, Upton, NY, 10-12 November 1975. p. 64-69.

Oil slicks, Spreading, Drift, Fate

The physical factors influencing the rate of spreading and the drift of an oil slick on a water surface are discussed.

[from Petroleum Abstracts 17(43):#239,706. 1977]

3. SOCIAL/ECONOMIC ASPECTS

C-1368-78
WHY CLEAN UP OIL SPILLS?
Mackay, D. 1978.
Spill Technology Newsletter 3(4):11-16.

Spill cleanup, Arctic, Social effects, Economics, Environmental effects, *Remote regions

The author examines emerging social attitudes and implications of oil spill cleanup in remote arctic regions, where a spillage might cause little economic loss, have only a transient or slight ecological effect, pose no risk to endangered species and have a negligible effect on human health. He concludes that the basic imperative for oil spill cleanup is that society regards an oiled environment as offensive; and while there may be economic, aesthetic, or ecological incentives for cleanup, they are incidental to that basic, simple imperative.

C-1369-78
ECOLOGICAL STUDIES OF THE COASTAL ZONE AFFECTED BY POLLUTION FROM THE 'NORTHERN BREEZE'. 3. ECOLOGICAL DATA AND DESTRUCTION OF RESOURCES. [English summary]
Santelices, B., and J.C. Castilla. 1977.
Medio Ambiente 2(2):84-91.

Economic effects, Fish, Invertebrates, Algae, Oil spills, Chile, *Northern Breeze spill

This report evaluates the marine resource damage resulting from the Northern Breeze oil spill, September 15, 1975, along 46 km of sandy and rocky shores in central Chile. About 6% of the intertidal surface was covered by oil. Destruction of 6% of the economically important macro-algae resulted in losses of about US $14,000. The economic importance of invertebrates could not be evaluated. However, the fish and shellfish extracted from the endangered area in 1975 were equivalent to US $440,000, supporting a labor force of 478 fishermen and their families, and these resources were jeopardized by the oil spill.

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #4565-1Q8. 1978]

4. ENVIRONMENTAL RESTORATION AND RECOVERY

C-1370-78
RECOVERY AND RESTORATION OF DAMAGED ECOSYSTEMS
Cairns, J., Jr., K.L. Dickson, and E.E. Herricks (eds.). 1977.
Charlottesville, University Press of Virginia, 1977. x + 531 p.

Recovery, Ecosystems, Environmental deterioration, Resource management, Restoration

Three major topics are covered in this book on environmental recovery from anthropogenic degradation: "the nature of recovery processes for various ecosystems; identification of the elements common to the recovery processes for all ecosystems, as well as the unique attributes in different kinds of ecosystems; and the prospects for accelerated recovery and restoration by human intervention and management." This book is an outgrowth of a 1975 symposium, and includes three chapters which deal specifically with oil pollution: "The Santa Barbara Oil Spill: An Ecological Disaster?" (Foster and Holmes); "Recovery of Some British Rocky Seashores from Oil Spills and Cleanup Operations" (Nelson-Smith); and "Changes in the Vegetation of an Oiled Southampton Water Salt Marsh" (Dicks). [Papers were abstracted separately in OPR Aug-Oct 1977.]

C-1371-78
OIL ON NORTHERN ECOSYSTEMS (book review)
Clark, R.B. 1978.
Marine Pollution Bulletin 9(7):196.

Fate, Recovery, Restoration, Marine organisms, Intertidal zone, Chronic effects, Book review, *Proceedings

A favorable review is given of Recovery Potential of Oiled Marine Northern Environments [Journal of the Fisheries Research Board of Canada 35(5):499-795. 1978 (Special issue)], the proceedings of an international conference held in Halifax, Nova Scotia, in October 1977. The conference and subsequent proceedings were divided into three sections: long-term fate of petroleum hydrocarbons following a spill, physiological stresses and response to chronically oiled organisms, and long-term effects of oil spills on intertidal communities.

5. GENERAL ASPECTS

C-1372-78
GESAMP HAS ITS TENTH BIRTHDAY (news brief)
Anon. 1978.
Marine Pollution Bulletin 9(9):227.

Environmental protection, Biological effects, Pollution prevention, Ships, Monitoring, UN, *Conference, *GESAMP

Among the topics reviewed at the recent tenth session of the United Nations Joint Groups of Experts on the Scientific Aspects of Marine Pollution (GESAMP) were the evaluation of the hazards of harmful substances carried by ships, the monitoring of biological variables, and the protection of particularly sensitive marine regions. [possibly oil pollution related]

C-1373-78
POLLUTION THREATENS MEDITERRANEAN COAST LINE
Anon. 1977.
World Dredging 13(12):34-35.

Contamination, Mediterranean Sea, Shorelines, Sources, Tar, Pollution control, Environmental deterioration

Aquatic pollution affecting Spain, France, Italy, Greece and Yugoslavia was assessed in a 296-page study by Frost and Sullivan, Inc., a New York based firm specializing in technological market research. The conclusions follow: the majority of beaches and harbors along the Mediterranean coast, where tar residues are a common problem, are severely contaminated; the critical level of pollution results from sources such as untreated domestic sewage, industrial effluents, and oil spills and discharges; and drinking water supplies have become a concern. Some of the pollution prevention and control measures being undertaken by these countries are also described.

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #4483-1Q8. 1978]

C-1374-78
REPORT OF THE EIGHT SESSION ROME, 21-27 April 1976
Anon. 1976.
GESAMP (IMCO/FAO/UNESCO/WMO/IAEA/UN Joint Group of Experts on the Scientific Aspects of Marine Pollution), 1976. 39 p. (Reports and Studies, No. 4)

Environmental effects, Oil spills, Offshore exploration, Offshore development, Wastewaters, Biological effects, UN, *GESAMP

A review and evaluation of the harmful substances in the marine environment are presented, and a special report on the environmental impact of oil spills is included. Other relevant topics examined include scientific aspects of pollution arising from the exploration and the exploitation of the seabed, scientific aspects of removal of harmful substances from wastewater, and monitoring biological parameters of marine pollution.

[from Oceanic Abstracts 15(2):#78-02659. 1978]

C-1375-78
THE HUMBER ESTUARY
Jones, N.V. (ed.). 1977.
Hull, UK, University of Hull, 1977. n.p. A Joint Symposium: The Humber Estuary, Cottingham, UK, 12 Dec 1973.

Estuaries, Oil industry, Fisheries, Water quality, Environmental management, *Proceedings

"The proceedings presents 18 papers dealing with the uses and investigations of the Humber Estuary, including industrial development, oil industry, amenity and recreation, salmon and freshwater fisheries, and estuarine and coastal fisheries. Environmental studies are included on water quality, physical characteristics, sedimentology, invertebrate distribution, distribution of heavy metals in the Estuary and its organisms, biology of young fish, and birds of the Estuary." [possibly oil pollution related]

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #4477-1Q8. 1978]

C-1376-78
ENVIRONMENT AND MAN, VOLUME 5. THE MARINE ENVIRONMENT
Lenihan, J., and W.W. Fletcher (eds.). 1977.
New York, Academic Press, 1977. xiv + 170 p.

Environmental effects, Oil spills, Oceans, *Book

The book deals with problems related to the marine environment. One chapter is devoted to the subject of oil spills.

[from Biological Abstracts 65(10):#58482. 1978]

C-1377-78
POLLUTION BY HYDROCARBONS: SOME ORIGINAL SOLUTIONS [in French]
Margara, A. 1977.
Industrie du Petrole dans le Monde-Gaz-Chimie 45(481):35,37,39.

Hydrocarbons, Detection, Sources, Biological effects, Biodegradation, Oceans, Freshwater, Industries, Pollution control, Wastewaters

The following topics are discussed: detection of hydrocarbon pollutants in surface water by thermographic means; sources and annual input of ocean pollutants; biodegradation; effects of river and lake pollution; and cleanup of industrial effluents.

[from Petroleum Abstracts 17(36):#238,002. 1977]

C-1378-78
PETROLEUM HYDROCARBONS IN MARINE SEDIMENTS AND ANIMALS FROM THE ISLAND OF MALTA
Sammut, M., and G. Nickless. 1978.
Environmental Pollution 16(1):17-30.

Hydrocarbons, PAH, Sediments, Marine organisms, Biological effects, Tar, Sources, Tankers, Mediterranean Sea

Results of field sampling and analysis indicate that marine sediments and organisms from the Maltese coast contain petroleum hydrocarbons. The primary source is probably minute tar balls originating from flushing operations of oil tankers using the heavily traveled shipping lanes of the nearby Mediterranean narrows; pleasure craft and sewage effluent are also contributing sources. Polynuclear aromatic hydrocarbons (PAHs) were found in appreciable amounts in some of the marine sediments, and were also detected in the gut of the grey mullet (Mugil cephalus).

D. ASPECTS OF OIL EXPLORATION AND PRODUCTION

1. BIOLOGICAL ASPECTS

C-1379-78
ECOLOGICAL ASPECTS OF GLOBAL SEA POLLUTION
Patin, S.A. 1977.
Oceanography 16(4):354-357.

Sources, Toxicity, Oceans, Petroleum products, Crude oil, Biological effects, Food web, Phytoplankton, *Nekton

The sources and degree of toxicity of the main groups of global toxicants, including crude oil and petroleum products, are presented; levels of concentration are reported for both pelagic and shelf waters. A decrease in photosynthesis and in biomass of phytoplankton and a subsequent decrease in nekton production may endanger the food web. [also published in Okeanologiia 16(4):621-626. 1976]

[from Oceanic Abstracts 14(6):#77-05663. 1977]

2. PHYSICAL/CHEMICAL ASPECTS

C-1380-78
FACTORS THAT INFLUENCE THE LEACHING OF ORGANIC MATERIAL FROM IN SITU SPENT SHALE
Amy, G., and J. Thomas. 1977.
Interamerican Confederation of Chemical Engineering and Asian Pacific Confederation of Chemical Engineering, Pacific Chemical Engineering Congress, 2nd, Denver, 1977. Volume 1. p. 398-402.

Oil shale, Groundwater, Contamination, *Leaching

"A series of batch and continuous flow experiments was run in order to assess the potential for contamination of ground water by organic material leached from in situ spent shale...Factors that significantly influenced the concentration of organic material present in leachate included (1) retorting conditions associated with spent shale, (2) spent shale particle size, (3) water temperature, and (4) leaching time."

[from Petroleum Abstracts 17(49):#241,648. 1977]

C-1381-78

ENVIRONMENTAL ASPECTS OF A WELL BLOWOUT IN THE GULF OF MEXICO
Brooks, J.M., B.B. Bernard, T.C. Sauer, Jr., and H. Abdel-Reheim.
1978.
Environmental Science and Technology 12(6):695-703.

Blowouts, Hydrocarbons, Sediments, Environmental effects, Chemical analysis, Texas, Gulf of Mexico

Results of studies conducted four months after a well blowout on the Texas continental shelf are presented. They include: seep rate and composition of escaping gas; current measurements of the blowout crater; and concentrations of hydrocarbon compounds in the water and in the redeposited sediments. "The impact of the blowout on temperature, salinity, dissolved oxygen, DOC, POC, TSM, helium, CO_2, ΣCO_2, and sulfate in the waters and sediment" are also evaluated.

3. SOCIAL/ECONOMIC ASPECTS

C-1382-78

1976 - DISASTER YEAR FOR MARINE UNDERWRITERS
Anon. 1977.
Naval Architect, No. 2:46.

Economic effects, Insurance, Oil industry, Tankers, Development, Oil spills, *Claims

The shipping slump, depressed premium rates, currency problems and widespread inflation, and merchant shipping casualties plagued marine underwriters in 1976. Tanker disasters included the Berge Istra, the Olympic Bravery, the Sansinena, and the Argo Merchant; offshore losses included the grounding of the semisubmersible Deep Sea Driller. "Twenty-four markets were involved in claims from what has been described as the biggest single marine loss in recent years."

[from Oceanic Abstracts 15(1):#00927. 1978]

C-1383-78
PRIMARY RISK EVALUATION FOR OFFSHORE FIELDS IN THE NORTH SEA
Roxburgh, G. 1977.
Petroleum Times 81(2049):69, 71-72.

Offshore development, *Risk analysis, Platforms, Safety, Economic effects, Oil industry, North Sea

The author distinguishes between the primary, secondary, and tertiary levels of risk involved in the development of offshore oil and gas. He suggests that primary risks, which include platform failure, well blowout, storage vessel failure, enemy attack, seismic failure, iceberg impact, major fire and explosion, major design failure, and major pipeline failure, should be given overriding consideration in future plans for exploitation of North Sea energy resources. A discussion and table are presented of the various platform types and associated primary risks based on the degree of platform fixity to the sea bed.

4. GENERAL ASPECTS

C-1384-78
ENERGY AND THE OCEANS
Borgese, E.M. 1977.
Energy Technology and Global Policy. S.A. Saltzman and E.M. Borgese (eds.). Santa Barbara, California, Clio Books, 1977. p. 217-230.

Offshore development, Drilling, Oceans, Biological effects, Environmental management, Sources, Regulations, Monitoring

A brief history of offshore oil production is given and several other energy sources involving the ocean, including ocean-based nuclear power plants, are discussed. Contributing sources of oil pollution and some of its biological effects are briefly outlined. The need for international regulations and monitoring programs is emphasized.

C-1385-78
OIL AND GAS USE CHARACTERIZATION, IMPACTS, AND GUIDELINES
Conner, W.H., J.H. Stone, L.M. Bahr, V.R. Bennet, and J.W. Day, Jr. 1976.
Louisiana State University Sea Grant Publication No. LSU-T-76-006. 157 p.

Production, Industries, Guidelines, Environmental effects, *Review, *Wetlands

"A nontechnical survey of oil and gas activities and their impacts on wetland, and a discussion of preliminary guidelines for optimizing production and minimizing impact are presented." [possibly oil pollution related]

[from Petroleum Abstracts 17(52):#242,709. 1977]

C-1386-78
SURFACE SAFETY SYSTEMS FOR OFFSHORE PLATFORMS
Latham, W.T. 1976.
Automation in Offshore Oil Field Operations. F.L. Galtung, K. Roesandhaug, and T.J. Williams (eds.). Amsterdam, Netherlands, North-Holland Publishing Company, 1976. p. 83-88. (Computer Applications in Shipping and Shipbuilding, Vol. 3)

Platforms, Offshore development, Design-engineering, Safety, Pollution control, Regulations

Increased government codes, rules, and regulations have established strict requirements for installation, operation, testing, and maintenance of surface safety equipment on offshore production platforms. These criteria are leading towards the standardization of platform sytems. Pneumatic/hydraulic equipment and systems designs currently operating in US waters meet or exceed federal regulations; systems are adaptable to international platforms to provide the same high degree of safety and pollution control.

[from Oceanic Abstracts 14(5):#77-04775. 1977]

C-1387-78
DEEPWATER PORTS
Loughry, T. 1977.
Surveyor 11(1):18-23.

Deepwater ports, *LOOP, *Seadock, Spill cleanup, Compensation, Pollution prevention, Gulf of Mexico

Licenses filed December 1976 with the CEQ permit the construction and operation of two DWPs in the Gulf of Mexico: the Louisiana Offshore Oil Port (LOOP) and the Seadock facility. A proposed 2-cent levy per barrel of crude oil brought ashore will contribute towards building a $100 million fund for cleanup of any spills should they occur. The best available preventative technology is mandated in design and construction of the facilities.

[from Oceanic Abstracts 14(6):#77-05862. 1977]

C-1388-78
INVENTORY OF ENERGY RESEARCH AND DEVELOPMENT: 1973-1975. Volume III. Serial U.
US Congress. House. Committee on Science and Technology. 1976.
Report NSF/RA-760495, Grant NSF-AER74-18999-A01. (Supersedes N77-13527).

Exploration, Production, Economic effects, Legislation, Regulations, Oil spills, Disposal, *Overview

"This inventory provides an overview of the [research and development] being performed in every aspect of energy exploration, production, distribution, use and conservation." The section entitled "Economic and Legal Aspects" includes a chapter on policy, legislative, and regulatory aspects. The section entitled "Environmental and Health - Energy Related"contains chapters on water pollution, oil spills, and waste product utilization and disposal.

[from Government Reports Announcements 77(10):#PB-265 127/1GA. 1977]

5. BASELINE AND ENVIRONMENTAL IMPACT STUDIES

C-1389-78
FINAL ENVIRONMENTAL STATEMENT. OCS SALE NO. 42
Bureau of Land Management. 1977.
Washington, DC, US Department of the Interior, 1977. 653 p. Volume 1.

EIS, OCS, Environmental effects, Oil-gas leasing, Socioeconomic effects, Atlantic Coast

The environmental impacts of the proposed sale of oil and gas leases on the North Atlantic Outer Continental Shelf are analyzed. "All tracts offered pose some degree of pollution risk to the environment." Accidental and chronic spillages are included among the possbile sources of pollution. Certain tracts will pose a particular risk to pelagic birds and commercial fishing. Local socioeconomic and environmental effects may also result.

[from Petroleum Abstracts 17(48):#241,461. 1977]

C-1390-78
FINAL ENVIRONMENTAL STATEMENT. OCS SALE NO. 42
Bureau of Land Management. 1977.
Washington, DC, US Department of the Interior, 1977. 564 p. Volume 2.

EIS, OCS, Offshore development, Environmental effects, Oil-gas leasing, Onshore impacts, Atlantic Coast

Included in this EIS for the proposed sale of oil and gas leases on the Atlantic Outer Continental Shelf are sections on the following: impact on the environment and basic assumptions regarding causes of offshore environmental impacts; impact of oil and gas operations on the offshore environment; and onshore impacts of oil and gas operations.

[from Petroleum Abstracts 17(48):#241,462. 1977]

C-1391-78
OUTER CONTINENTAL SHELF (OCS) OIL AND GAS LEASE SALE NO. C1:
LOWER COOK INLET. VOLUME 1, PART 1
Bureau of Land Management. 1976.
Report BLM/ME-78-04a. 589 p. Final environmental impact statement.

EIS, Oil-gas leasing, OCS, Offshore development, Alaska, BLM, *Lower Cook Inlet

A sum of 152 tracts (0.36 million hectares) off the coast of the Kenai Peninsula are proposed to be leased for exploration, development, and production of oil and gas. This document includes the Proposal, Description of the Environment, and Impact of the Proposal.

[from Government Reports Announcements 78(1):#PB-272 966/3GA. 1978]

C-1392-78
OUTER CONTINENTAL SHELF (OCS) OIL AND GAS LEASE SALE NO. C1:
LOWER COOK INLET. VOLUME 1, PART 2
Bureau of Land Management. 1976.
Report BLM/ME-78-04b. 574 p. Final environmental impact statement.

EIS, Oil-gas leasing, OCS, Offshore development, Alaska, BLM, *Lower Cook Inlet

A sum of 152 tracts (0.36 million hectares) off the coast of the Kenai Peninsula are proposed to be leased for exploration, development, and production of oil and gas. This volume includes the Proposal, Description of the Environment, and Impact of the Proposal.

[from Government Reports Announcements 78(1):#PB-272 967/1GA. 1977]

C-1393-78
OUTER CONTINENTAL SHELF (OCS) OIL AND GAS LEASE SCALE NO. C1: LOWER COOK INLET. VOLUME 2
Bureau of Land Management. 1976.
Report BLM/ME-78-05. 900 p. Final environmental impact statement.

EIS, Oil-gas leasing, OCS, Offshore development, Alaska, BLM, *Lower Cook Inlet

A sum of 152 tracts (0.36 million hectares) off the coast of the Kenai Peninsula are proposed to be leased for exploration, development, and production of oil and gas. Volume 2 reviews "adverse and irretrievable impacts and resource loss," short- and long-term consequences of the proposal, mitigation, and alternatives.

[from Government Reports Announcements 78(1):#PB-272 968/9GA. 1978]

C-1394-78
STRATEGIC PETROLEUM RESERVE
Federal Energy Administration. 1977.
Report FEA/S-77/329, FES-76/2 - Draft Supplement. Final environmental impact statement (draft supplement).

EIS, Storage, Crude oil, Environmental effects, *Strategic Petroleum Reserve

The final programmatic EIS and the Strategic Petroleum Reserve (SPR) Plan evaluated the impacts of storing one hundred fifty million barrels (MMB) of oil by 1978 and five hundred MMB by 1982. The environmental impacts of the proposed SPR expansion to store a total of 1,000 MMB are addressed in this supplement.

[from Government Reports Announcements 78(2):#PB-273 487/9GA. 1978]

C-1395-78
STRATEGIC PETROLEUM RESERVE: CAPLINE GROUP SALT DOMES. BAYOU CHOCTAW EXPANSION. CHACAHOULA, IBERIA, NAPOLEONVILLE, WEEKS ISLAND EXPANSION. VOLUME I
Federal Energy Administration. 1977.
Report FEA/S-77/339, DES-77/9-Vol-1. 374 p. Draft environmental impact statement.

EIS, Storage, Crude oil, Environmental effects, Louisiana, *Strategic Petroleum Reserve

This site-specific EIS for 5 candidate sites comprising the Capline Group of salt domes located in the Gulf Coast region of south central Louisiana analyzes the environmental impacts which could occur during site preparation and operation. The primary site for SPR development in this area is the Napoleonville salt dome located in Assumption Parish, Louisiana. Two of the other potential sites are new, and two are expansions of Early Storage Reserve facilities.

[from Government Reports Announcements 78(2):#PB-273 542/1GA. 1978]

C-1396-78
STRATEGIC PETROLEUM RESERVE: CAPLINE GROUP SALT DOMES. BAYOU CHOCTAW EXPANSION, CHACAHOULA, IBERIA, NAPOLEONVILLE, WEEKS ISLAND EXPANSION. VOLUME II
Federal Energy Administration. 1977.
Report FEA/S-77/340, DES-77/9-Vol-2. 450 p. Draft environmental impact statement.

EIS, Storage, Crude oil, Environmental effects, Louisiana, *Strategic Petroleum Reserve

This site-specific EIS for 5 candidate sites comprising the Capline Group of salt domes located in the Gulf Coast region of south central Louisiana analyzes the environmental impacts which could occur during site preparation and operation. The primary site for SPR development in this area is the Napoleonville salt dome located in Assumption Parish, Louisiana. Two of the other potential sites are new, and two are expansions of Early Storage Reserve facilities. Volume II contains Appendixes A and B which describe the project and the environment. [possibly oil pollution related]

[from Government Reports Announcements 78(2):#PB-273 543/9GA. 1978]

C-1397-78
STRATEGIC PETROLEUM RESERVE: CAPLINE GROUP SALT DOMES. BAYOU CHOCTAW EXPANSION, CHACAHOULA, IBERIA, NAPOLEONVILLE, WEEKS ISLAND EXPANSION. VOLUME III
Federal Energy Administration. 1977.
Report FEA/S-77/341, DES-77/9-Vol-3. 549 p. Draft environmental impact statement.

EIS, Storage, Crude oil, Environmental effects, Louisiana, *Strategic Petroleum Reserve

This site-specific EIS for 5 candidate sites comprising the Capline Group of salt domes located in the Gulf Coast region of south central Louisiana analyzes the environmental impacts which could occur during site preparation and operation. The primary site for SPR development in this area is the Napoleonville salt dome located in Assumption Parish, Louisiana. Two of the other potential sites are new, and two are expansions of Early Storage Reserve facilities. Appendixes C through J are contained in this volume. [possibly oil pollution related]

[from Government Reports Announcements 78(2):#PB-273 544/7GA. 1978]

C-1398-78
STRATEGIC PETROLEUM RESERVE. FINAL ENVIRONMENTAL IMPACT STATEMENT FOR KLEER MINE
Federal Energy Administration. 1977.
Report FEA/S-77/324, FES 77-2. 584 p.

EIS, Storage, Oil transport, Oil spills, *Strategic Petroleum Reserve

Among the adverse effects that could result from the development of the proposed oil storage facility at Kleer Mine, Texas, is the potential for increased frequency of oil spills along the transportation corridors.

[from Petroleum Abstracts 17(48):#241,442. 1977]

C-1399-78
STRATEGIC PETROLEUM RESERVE. SEAWAY GROUP SALT DOMES. BRYAN MOUND EXPANSION, ALLEN, DAMON MOUND, NASH, WEST COLUMBIA
Federal Energy Administration. 1977.
Report FEA/S-77/344, DES 77-10. 143 p. Draft environmental impact statement. Volume 1.

EIS, Storage, Environmental effects, *Strategic Petroleum Reserve

This site-specific EIS assesses the potential environmental effects of development of a Strategic Petroleum Reserve facility at any of the five title candidate locations.

[from Petroleum Abstracts 17(48):#241,445. 1977]

C-1400-78
STRATEGIC PETROLEUM RESERVE. SEAWAY GROUP SALT DOMES. BRYAN MOUND EXPANSION, ALLEN, DAMON MOUND, NASH, WEST COLUMBIA
Federal Energy Administration. 1977.
Report FEA/S-77/346, DES 77-10. 319 p. Draft environmental impact statement. Volume 2.

EIS, Storage, Oil spills, *Brine spills, *Risk analysis, *Strategic Petroleum Reserve

Included in this EIS on the proposed Bryan Mound site and the four alternate sites for the development of a Strategic Petroleum Reserve facility is a section on oil and brine spill risk analysis.

[from Petroleum Abstracts 17(48):#241,446. 1977]

C-1401-78
STRATEGIC PETROLEUM RESERVE. TEXOMA GROUP SALT DOMES. VOLUME 1. WEST HACKBERRY EXPANSION, BLACK BAYOU, VINTON, BIG HILL
Federal Energy Administration. 1977.
Report DES 77-8, FEA/S-77/323. 389 p. Draft environmental impact statement.

EIS, Storage, Environmental effects, *Strategic Petroleum Reserve

The proposed plan for Strategic Petroleum Reserve development in the Texoma salt dome group involves the expansion of the West Hackberry Early Storage Facility. One or a combination of the other three title sites may be developed as an alternative. The environmental impacts of development are analyzed for each site in this EIS.

[from Petroleum Abstracts 17(45):#240,474. 1977]

C-1402-78
STRATEGIC PETROLEUM RESERVE. TEXOMA GROUP SALT DOMES. VOLUME 2. APPENDIX C. WEST HACKBERRY EXPANSION, BLACK BAYOU, VINTON, BIG HILL
Federal Energy Administration. 1977.
Report DES 77-8, FEA/S-77/323. 500 p. Draft environmental impact statement.

EIS, Storage, Oil spills, Oil transport, Oil terminals, *Risk analysis, *Strategic Petroleum Reserve

This section of the EIS assesses the potential for the occurrence of accidents with emphasis on oil spill potential at the West Hackberry site where expansion of the Early Storage Reserve facility is proposed and at the three alternative sites. The risk of spills greater than 1,000 bbl is generally less than 1% except during tanker transport in the Sabine-Neches Channels and at the Sun Terminal dock.

[from Petroleum Abstracts 17(45):#240,476. 1977]

C-1403-78
STRATEGIC PETROLEUM RESERVE. TEXOMA GROUP SALT DOMES. VOLUME 4. APPENDICES. WEST HACKBERRY EXPANSION, BLACK BAYOU, VINTON, BIG HILL
Federal Energy Administration. 1977.
Report DES 77-8. FEA/S-77/323, 750 p. Draft environmental impact statement.

EIS, Storage, Environmental effects, Oil spills, *Risk analysis, *Strategic Petroleum Reserve

Included in these appendices is information on oil spill risk, oil pollution, and ecological impacts of oil spills, as well as other data relevant to the Strategic Petroleum Reserve development in the Texoma group of salt domes.

[from Petroleum Abstracts 17(45):#240,478. 1977]

C-1404-78
COASTAL MORPHOLOGY AND SEDIMENTATION, LOWER COOK INLET, ALASKA, WITH EMPHASIS ON POTENTIAL OIL SPILL IMPACTS
Hayes, M.O., P.J. Brown, and J. Michel. 1976.
Technical Report No. 12-CRD, University of South Carolina. - p.

Baseline studies, Shorelines, Sedimentation, Oil spills, Fate, Ecosystems, Alaska, *Vulnerability index, *Lower Cook Inlet

Erosional, depositional, or neutral categories were assigned to 1,200 km of shoreline at the title area on the basis of ground studies at 57 localities and more detailed sediment and morphologic studies at 10 selected sites. Neutral and depositional shorelines appear to be the areas of greatest longevity of oil spills based on studies of the Metula spill in the Strait of Magellan. Salt marshes and tidal flat areas of the west shore of the inlet and the gravel-paved intertidal zone of the lower shoreline of Kachemak Bay are especially susceptible.

C-1405-78
VULNERABILITY OF COASTAL ENVIRONMENTS OF LOWER COOK INLET, ALASKA TO OIL SPILL IMPACT
Hayes, M.O., J. Michel, and P.J. Brown. 1977.
International Conference on Port and Ocean Engineering Under Arctic Conditions, 4th, Memorial University of Newfoundland, September 26-30, 1977. - p. Preprint.

Baseline studies, Shorelines, Sedimentation, Oil spills, Fate, Ecosystems, Alaska, *Vulnerability index, *Lower Cook Inlet

A field study of the coastal morphology and sediments of the title area was conducted in June 1976, with emphasis on the behavior of potential oil spills. Classification of 1216 km of shoreline was by erosional (45%), neutral (38%), and depositional (17%) types, with 16 subclasses. The longevity of oil in different coastal environments was predicted by use of this classification in conjunction with a vulnerability index of potential oil spill damage, developed through study of 2 major oil spills. Values were assigned from a longevity scale of 1-10, with 45% of the shoreline receiving values of 1-4 (dispersion by natural processes within less than 6 months), and 41.5% receiving a 6-10 rating (oil contamination to remain 2-10 years).

C-1406-78
RECOMMENDATIONS FOR MICROBIOLOGICAL STUDIES IN THE CONTINENTAL SHELF AREAS
National Oceanic and Atmospheric Administration. Environmental Research Laboratories. 1977.
Report NOAA-TM-ERL-MESA-16. 50 p. NOAA Technical Memorandum. Marine Ecosystems Analysis Program.

Baseline studies, Guidelines, Biodegradation, Microorganisms, OCS, Offshore development, Analytical techniques, NOAA, Alaska

During the preparation of a 5-yr plan for the BLM-supported studies to be conducted on the Alaskan OCS before oil and gas development proceeded, workshop participants were asked to propose techniques for the following studies: Characterization of the existing microbial populations; the anthropogenic effect on natural microbiological communities; the effect of those communities on OCS activities; and requirements for supporting data and information on related processes. This report compiles a detailed list of microbiological studies that the group agreed should be included in marine assessment programs, and describes standardized sampling procedures and requirements.

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #4586-1Q8. 1978]

C-1407-78
THE INTERTIDAL AND SHALLOW SUBTIDAL BENTHOS OF THE STRAIT OF JUAN DE FUCA
Nyblade, C.F. 1978.
NOAA Technical Memorandum ERL MESA-26. 151 p. (est.) Spring 1976 - Winter 1977.

Baseline studies, Benthos, Habitats, Marine organisms, Environmental effects, Oil transport, Oil transfer, Puget Sound

The first year's report is presented for this component of a larger baseline study project designed to identify the potential environmental consequences of increased petroleum transport and transfer activities anticipated for the greater Puget Sound region. Research objectives include: definition of habitat types present in the title area, largely according to substratum/exposure; selection of 10 representative sites along the length of the Strait; quarterly determination of community composition at each site; and determination of the vertical distribution of the habitat organisms.

C-1408-78

COASTAL MORPHOLOGY, SEDIMENTATION AND OIL SPILL VULNERABILITY, NORTHERN GULF OF ALASKA
Ruby, C.H. 1977.
Technical Report No. 15-CRD, University of South Carolina. 223 p.

Baseline studies, Shorelines, Sedimentation, Oil spills, Ecosystems, Gulf of Alaska, *Vulnerability index

The 986 km of shoreline studied were classified as erosional (23%), depositional (19%), and neutral (58%) shorelines, with 11 subclasses. These geomorphic baseline studies were used in conjunction with field work at 5 oil spills in various coastal environments to evaluate the title area in terms of potential oil spill impacts. The oil spill vulnerability is based primarily on the longevity of spilled oil within each geomorphic subenvironment, with consideration of biologic sensitivity as well. Risk classification ratings are given.

C-1409-78

HYDROCARBONS IN THE MARINE ENVIRONMENT OF PORT VALDEZ, ALASKA
Shaw, D.G., and B.A. Baker. 1978.
Environmental Science and Technology 12(10):1200-1205.

Baseline studies, Hydrocarbons, Tankers, Ballast, Biological effects, Alaska, *Trans-Alaska Pipeline, *Port Valdez

Sampling and analysis of biota, water, and sediments of Port Valdez for saturated and unsaturated hydrocarbons were performed during the year prior to the completion of the trans-Alaska pipeline. The results show "kinds and amounts of hydrocarbons typical of unpolluted nearshore environments. Common, prominent compounds include pristane, heptadecane, odd chain length normal alkanes with 21-31 carbon atoms, and a triterpene tentatively identified as squalene." This study provides baseline data for evaluating the fate and effects of oil entering the environment through the operation of the tanker loading facility.

E. FATE OF OIL IN THE ENVIRONMENT

1. BIODEGRADATION

C-1410-78
MICROORGANISMS AND PETROLEUM POLLUTANTS
Atlas, R.M. 1978.
Bioscience 28(6):387-391.

Biodegradation, Hydrocarbons, Spill cleanup, Pollution control, Environmental management, Microorganisms

Microorganisms play a key role in degrading petroleum pollutants. The rates and thoroughness of degradation depend on the molecular structures of the different classes of hydrocarbons, the hydrocarbons present in a mixture, and whether the source of pollution is acute or chronic. The author also discusses seeding techniques and environmental modifications which enhance the process of microbial biodegradation.

C-1411-78
THE MICROBIOLOGY OF AQUATIC OIL SPILLS
Bartha, R., and R.M. Atlas. 1977.
Advances in Applied Microbiology. D. Perlman (ed.). New York, Academic Press, 1977. Vol. 22:225-265.

Biodegradation, Microorganisms, Oil spills, Oil discharges, Sources, Behavior, Emulsification, Spill cleanup, *Review

A literature review with 156 references is presented, dealing with microbiological aspects of accidental or routine oil discharges into aquatic environments. The following topics are covered: the sources and behavior of oil pollutants; effects of petroleum hydrocarbons on microbial populations and their diversity; microbial emulsification and degradation of petroleum components; the effects of cleanup techniques on biodegradation; and the use of stimulated oil biodegradation in oil pollution abatement.

C-1412-78
HYDROCARBON DEGRADATION (book review)
Corner, E.D.S. 1978.
Marine Pollution Bulletin 9(8):224.

Biodegradation, Hydrocarbons, Oil spills, Oil slicks, Dispersion, Evaporation, Book review

A favorable review is given of the book Developments in Biodegradation of Hydrocarbons-1 [R.J. Wilkinson (ed.). London, Applied Science Publishers Ltd., 1978. x + 232 p.]. Chapter six addresses the subject of degradation of oil spills at sea, and emphasizes that dispersal mechanisms, especially evaporation, are mainly responsible for removing oil slicks.

C-1413-78
INTERMEDIATES FROM THE MICROBIAL OXIDATION OF ALIPHATIC HYDROCARBONS
Markovetz, A.J. 1978.
Journal of the American Oil Chemists' Society 55(4):430-434.

Biodegradation, Hydrocarbons, Microorganisms, Bacteria, Yeasts, Fungi, Oxidation, *Review

"A review, with 34 references, of the oxidation of saturated and unsaturated aliphatic hydrocarbons by bacteria, yeasts, and fungi."

[from Chemical Abstracts 88(25):#188000u. 1978]

C-1414-78
ENHANCEMENT OF MICROBIAL DEGRADATION OF OIL POLLUTANTS USING LIPOPHILIC FERTILIZERS
Olivieri, R., A. Robertiello, and L. Degan. 1978.
Marine Pollution Bulletin 9(8):217-220.

Biodegradation, Microorganisms, Spill cleanup, *Fertilizer, *Nitrogen, *Phosphorus

Lipophilic phosphorus and nitrogen containing compounds were screened to attain a viable fertilizer to enhance the microbial degradation of oil pollutants in the aquatic environment. Laboratory investigations proved that soya-bean lecithin and ethyl allophanate were good sources of phosphorus and nitrogen for degrading microorganisms. Simulated field experiments are in progress to verify findings.

C-1415-78
RECOMMENDATIONS FOR MICROBIOLOGICAL STUDIES IN THE CONTINENTAL SHELF AREAS
Outer Continental Shelf Environmental Assessment Program. 1977.
NOAA Technical Memorandum ERL MESA-16. 45 p. Results from two workshops convened 10-11 August 1976 and 19-20 October 1976 in Boulder, Colorado.

Biodegradation, Microorganisms, OCS, Oil spills, Acute effects, Chronic effects, Sampling

Presented are studies and techniques recommended by workshop participants for use in the following areas: 1) general characterization of the existing microbial populations; 2) anthropogenic effects on natural microbiological communities and their functioning (including acute and chronic oil spills); 3) effects of natural microbial communities on OCS activities (including pipeline corrosion and hydrocarbon degradation); and 4) requirements for supporting data and information on related processes. Sampling procedures and requirements are also covered.

C-1416-78
ANAEROBIC OXIDATION OF HYDROCARBONS BY DESULFOVIBRIO DESULFURICANS [English summary]
Stanev, Ts. 1977.
Izvestiya-Institut po Ribni Resursi, Varna/Izvestiya-Institut Rybnykh Resursov, Varna/Proceedings-Institute of Fisheries, Varna, Vol. 5:115-120.

Biodegradation, Bacteria, Oxidation, Hydrocarbons. *Desulfovibrio desulfuricans, *Wadden Sea

"Data are presented which indicate a slow oxidation of glucose, pentane, hexane, benzene and light petrol by D. desulfuricans isolated from the Wadden Sea (Holland)."

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #4591-1Q8. 1978]

C-1417-78
OIL DECOMPOSING BACTERIA IN VARNA BAY SEA WATER [English summary]
Stanev, Ts. 1977.
Izvestiya-Institut po Ribni Resursi, Varna/Izvestiya-Institut Rybnykh Resursov, Varna/Proceedings-Institute of Fisheries, Varna, Vol. 5:121-126.

Biodegradation, Microorganisms, Bacteria, Distribution, USSR, *Varna Bay

"From marine waters of Varna Bay bacteria that are capable of growth on different kinds of oils were isolated. Distribution and number of oil decomposing microorganisms were also established."

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #4590-1Q8. 1978]

C-1418-78
HYDROCARBON BIODEGRADATION IN HYPERSALINE ENVIRONMENTS
Ward, D.M. and T.D. Brock. 1978.
Applied and Environmental Microbiology 35(2):353-359.

Biodegradation, Hydrocarbons, Tar, Natural seepage, Chromatography, *Hypersaline environments

Experiments in which oil was added to natural samples of varying salinity (3.3-28.4%) indicated that microbial metabolism of the oil decreased with increasing salinity. Gas chromatographic examination of tar samples from natural seeps in Great Salt Lake showed no biodegradation of the isoprenoid alkanes that are subject to degradation in normal environments. These observations "raise doubt about the biodegradation of hydrocarbons in hypersaline environments."

[from Chemical Abstracts 88(2):#11818m. 1978]

2. PHYSICAL/CHEMICAL CHANGES

C-1419-78
LIGHT REFINED OILS DISCHARGED ON WATER SURFACE [English summary]
Namie, S., Y. Ueta, and H. Yamanouchi. 1978.
Nippon Hakuyo Kikan Gakkaishi 13(2):156-163.

Fate, Behavior, Petroleum products, Evaporation, Solubility, WSF, *Light refined oils

In experiments, the evaporation rates and aqueous solubilities of various light petroleum products were determined. Evaporation rates (from highest to lowest) were as follows: naphtha, gasoline, kerosine, Iranian light crude oil, and gas oil. Aqueous fractions consisted mainly of light paraffins and light aromatic hydrocarbons. The hydrocarbon contents of the WSFs were in almost the same order for gasoline, kerosine, and crude oil and increased as evaporation rates decreased.

[from Chemical Abstracts 89(4):#27192p. 1978]

3. GENERAL FATE OF OIL

C-1420-78
TWO YEARS AFTER THE METULA OIL SPILL, STRAIT OF MAGELLAN, CHILE: OIL INTERACTION WITH COASTAL ENVIRONMENTS
Blount, A.E. 1978.
Technical Report No. 16-CRD, University of South Carolina. 214 p.

Metula spill, Contamination, Ecosystems, Behavior, Fate, Movement, Distribution, *Coastal environments

The site of the *Metula* oil spill (August 9, 1974) was visited 12, 18, and 24 months after the spill to observe temporal changes in oil conditions. The most heavily polluted areas were two estuaries in the First Narrows, within 20 km of the site. The least amount of oil contamination was seen at wave-cut platforms and exposed tidal flats. "Oil retention in affected coastal environments has been a function of distance from the spill site, initial amount of oil contamination, tidal range, tidal phase at the time of deposition, wave energy, exposure to strong west winds, and sedimentological character."

C-1421-78
THE TRANSPORT AND FATE OF HYDROCARBONS IN BENTHIC ENVIRONMENTS
Boehm, P.D. 1977.
Dissertation Abstracts International, B, 38(4):1503-1504.

Hydrocarbons, Uptake, Fate, Sedimentation, Benthos, Biological effects, Atlantic Coast, Rhode Island, Mollusks

The author performed both laboratory analyses and field observations on the uptake of hydrocarbons by filter-feeders and a detailed study of Rhode Island Sound's benthic environments in order to determine hydrocarbon transport routes in the benthos and the relation between bivalves and the sediments in which they live. Recent sedimentation rates in the Sound were calculated on the basis of the presence of two anthropogenic chemical markers, petroleum hydrocarbons and PCBs, in one sample core and the known date of their introduction into the environment.

C-1422-78
HYDROCARBON BUDGETS FOR LAKE WASHINGTON
Wakeham, S.G. 1977.
Limnology and Oceanography 22(5):952-957.

Hydrocarbons, Lakes, Sources, Rivers, Sedimentation, Washington, *Runoff

"Fluxes of hydrocarbons through Lake Washington show that urban stormwater runoff and river runoff are the major sources of petroleum hydrocarbons to the lake. Sedimentation is the primary removal process for these hydrocarbons."

4. MODELS AND PREDICTIONS

C-1423-78
KEEPING UP WITH TECHNOLOGY - RISK EVALUATION
Eri, J. 1977.
Northern Offshore 6(2):24-25, 28-30.

Safety, *Risk analysis, Offshore development, Statistics, Industries

In evaluating risks, probabilities are assigned to events causing risks or hazards and to the chances of risk occurrence. Risk levels differ widely from industry to industry, and acceptable risk levels seem to vary in inverse proportion to the technical sophisitication and the recentness of industry establishment. Risk analysis of offshore oil and gas structures depends on a combination of factors including environmental phenomena, structural response, and strength capacity.

C-1424-78
A PROBALISITC MODEL FOR DISPERSIVE OIL LOSSES BENEATH OIL BOOMS
Fallah, M.H., and R.M. Stark. 1976.
Ocean Engineering 3(6):383-390.

Models, Booms, *Dispersive oil losses, Oil slicks, *Theoretical research

Wave action and current turbulence can cause substantial oil losses from a deployed oil boom. Vertically displaced oil, when carried by a current, escapes beyond the perimeter of the boom. These "dispersive oil losses" are studied using a random-walk model; probalistic descriptions are derived for the volume of oil losses. A hypothetical oil slick demonstrates an application of the model.

[from Oceanic Abstracts 14(6):#77-05681. 1977]

C-1425-78
OIL SPILL MODELLING: PROBLEMS AND PURPOSES
Mackay, D. 1978.
Spill Technology Newsletter 3(4):21-27.

Models, Oil spills, Behavior, Fate

An informal background paper is presented for the Oil Spill Modelling Workshop [Toronto, Canada, November 7-8, 1978]. Major objectives of the workshop are to evaluate the five major types of oil spill models, so that those which best meet the needs of different users and time considerations can be further developed. Other objectives are to coordinate modelling development, identify gaps in data acquisition, establish input and output requirements, and validate models.

C-1426-78
LONG-TERM DISPERSION OF CONTAMINANTS IN SMALL ESTUARIES
Smith, R. 1977.
Journal of Fluid Mechanics 82(1):129-146.

Contaminants, Dispersion, Models, Estuaries

The analysis of contaminant dispersion in small estuaries is simplified by the use of axes moving with the tide. The dominant mechanism for dispersion was found to be the transverse shear rather than the vertical shear. [possibly oil pollution related]

[from Petroleum Abstracts 17(45):#240,489. 1977]

C-1427-78
AMOP EXPERIMENTAL OIL SPILL PLANNING UPDATE
Thornton, D.E. 1978.
Spill Technology Newsletter 3(4):17-18.

Fate, Behavior, Arctic, Incineration, Dispersants, Spill cleanup, Ice, Estuaries, *Experimental oil spills

A project is underway to identify studies requiring experimental spillage of oil into arctic or sub-arctic marine environments. High priority study topics already selected for the use of experimental oil spills include: burning of oil in melt pools, against obstacles (booms, ice edges) and in East Coast ice; field testing of dispersant effectiveness; shoreline cleanup methods, and fate and effects of oil in pack ice and in arctic estuaries.

C-1428-78
INITIAL BEHAVIOR OF OIL SLICKS
Unno, J., and I. Inoue. 1978.
Journal of Chemical Engineering of Japan 11(1):13-18.

Oil slicks, Spreading, Behavior, Distribution, Fate, Models, *Prediction

"A theoretical study of oil slicks which predicts the spreading velocity and the distribution of film thickness was made. Limited agreement with experimental data indicates that further study is needed."

[from Chemical Abstracts 88(24):#173129u. 1978]

F. OIL POLLUTION REGULATIONS

1. LOCAL/STATE LEGISLATION

[No entries.]

2. US LEGISLATION

C-1429-78
LEGISLATIVE BILL TO MONITOR OCEAN POLLUTION PASSED IN SENATE
Anon. 1977.
World Dredging 13(12):37.

Legislation, Contamination, Oceans, Environmental effects, Monitoring, NOAA, US, *Research

The US Senate has unanimously passed a bill (S. 1617) to establish an ocean pollution research and monitoring program in NOAA. Assessment of the short- and long-term effects of pollutants, including oil, on the marine environment would be included in the program. The legislation requires a 3-yr federal plan for the program and annual report to Congress and the President on its progress.

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #3380-1Q8. 1978]

C-1430-78
CONTROLLING THE ENTRANCE OF TOXIC POLLUTANTS INTO U.S. WATERS
Barrett, B.R. 1978.
Environmental Science and Technology 12(2):154-162.

Legislation, Contingency planning, Health hazards, Pollution control, Environmental protection, Oceans, Freshwater, US

Nine federal laws regulating toxic pollutants in aquatic environments are reviewed in depth. Several are directly concenred with oil: Federal Water Pollution Control Act (FWPCA), especially Section 311, Oil and Hazardous Substance Liability, which includes a National Contingency Plan; Marine Protection, Research, and Sanctuaries Act of 1972 (Ocean Dumping Act); Resource Conservation and Recovery Act of 1976; Hazardous Materials Transportation Act of 1974; and the Ports and Waterways Safety Act of 1972.

3. INTERNATIONAL LEGISLATION

C-1431-78
INTERNATIONAL SAFETY MEASURES FOR TANKERS ADOPTED BY IMCO (news brief)
Anon. 1978.
Sea Technology 19(4):40.

Safety, Tankers, IMCO, Pollution prevention, Crude oil washing, Segregated ballast, *Inert gas systems, Guidelines, Surveillance

Among the measures adopted at the International Conference on Tanker Safety and Pollution Prevention were requirements for: crude oil washing (COW) systems and segregated ballast tanks (SBTs) systems for new crude oil vessels; either COW systems or SBTs for existing vessels; and inert gas systems (IGSs) installation for existing product carriers, within a time schedule which varies according to vessel size. US proposals for inspection and certification, backup radar, and improved emergency steering standards were also adopted. Additionally, IMCO was requested to develop standards for collision avoidance systems.

4. FOREIGN LEGISLATION

[No entries.]

5. STANDARDS AND GUIDELINES

C-1432-78
GREATER OIL POLLUTION OFF BRITISH COASTLINE (news brief)
Anon. 1978.
Marine Pollution Bulletin 9(7):170-171.

Pollution prevention, Guidelines, Regulations, Ships, Contingency planning, Spill cleanup, UK

An increase in the number of pollution incidents off the British coastline was stressed by Lord Ritchie-Calder, Chairman of the Advisory Committee on Oil Pollution of the Sea. In the Committee's 1977 Annual Report, the Government's anti-pollution standards are criticized as less effective than those advocated by other nations. The Committee urges the Government to campaign against sub-standard vessels, primarily flag-of-convenience ships, to research alternative cleanup devices, as Britain relies chiefly on dispersants, and to incorporate the concept of sea-use planning in Britain's maritime policy.

C-1433-78
POLICIES, PRACTICES, AND RESPONSIBILITIES FOR SAFETY AND ENVIRONMENTAL PROTECTION IN OIL AND GAS OPERATIONS ON THE OUTER CONTINENTAL SHELF
US Geological Survey. 1977.
Washington, DC, US Geological Survey, 1977. 28 p.

OCS, Offshore development; Government agencies, Regulations, Safety, Environmental protection, USCG

This report details the policies, practices, and responsibilities of the US Geological Survey in overseeing the safe operation of activities related to oil and gas extraction on the Outer Continental Shelf.

[from Petroleum Abstracts 17(36):#238,001. 1977]

6. AGREEMENTS AND CONVENTIONS

C-1434-78
IMCO'S 1969 AMENDMENTS OPERATIVE IN 1978
Anon. 1977.
Marine Engineers Review, June 1977:28.

International conventions, IMCO, Pollution prevention, Ships, Oil discharges, *Amendments

The 1969 Amendments to the 1954 International Convention for the Prevention of Pollution of the Sea by Oil are designed to reduce the quantity of operational oil discharges permitted by ships and will come into effect on January 20, 1978. The original 1954 Convention banned the discharge of oil and water containing 100 ppm of oil within 50 mi of land, and in certain vulnerable zones. The 1962 Amendments, enforced in 1967, extended the prohibited zones, and attempted to ban all discharges from new ships of 20,000 grt and above. The 1973 Convention is yet to be enforced.

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #4583-1Q8. 1978]

C-1435-78
POLLUTION PREVENTION: THE PROBLEM OF INTERNATIONAL AGREEMENT
Bartlett, T. 1977.
Dock and Harbor Authority 58(680):110-112.

IMCO, Regulations, International conventions, *Marine pollution convention

"Critical problems surrounding IMCO's 1973 Marine Pollution Convention are examined under the following headings: technology, politics, reception facilities, inspection, enforcement, penalties, and the future. The area of greatest general concern is the hastening of the International Convention ratification process." [possibly oil pollution related]

[from Oceanic Abstracts 15(2):#78-02050. 1978]

C-1436-78
EEC MOVES AGAINST MARINE POLLUTION (news brief)
Jenkins, S.H. 1978.
Marine Pollution Bulletin 9(7):172-173.

Pollution control, International conventions, Europe, Information systems, Compensation, *European Economic Community

In the May 2, 1978 issue of Euroform, the Commission of the European Communities advocates an anti-pollution program and continues to promote international action to prevent oil pollution. The Communities' action plan includes: processing and disseminating relevant information; strengthening cooperation between anti-pollution teams in its member countries; studying legal methods to insure compensation for spill cleanup and loss of income; and conducting research on short- and long-term effects of oil pollution on the marine environment.

C-1437-78
THE EEC AND THE LAW OF THE SEA
Reynolds, P.D. 1977.
Marine Policy 1(2):118-131.

International conventions, Foreign governments, Resource management, *European Economic Community, *Law of the Sea, *Jurisdiction

The European Economic Community (EEC) participation in a future Law of the Sea convention is debated. Authority of the Community in matters related to law of the sea includes those of fishing, oil and gas exploration and exploitation, shipping and sea transport, mining of the continental shelf, marine pollution, and commodity agreements and tariffs. The debate over EEC jurisdiction and a possible resolution are described.

[from Oceanic Abstracts 15(1):#00840. 1978]

C-1438-78
A DECADE LATER AND THE STRENGTHENING OF INTERNATIONAL LAW
Sasamura, Y. 1977.
Safety at Sea International, No. 104:21-24.

International conventions, Pollution control, Ships, IMCO, UN

During the decade since the Torrey Canyon spill, IMCO has adopted the International Convention for the Prevention of Pollution from Ships while intensifying its pollution control activities. "In this extract from a paper delivered at a seminar organised by the United Nations Environment Programme in Paris the author gives a personal view of the provisions dealing with pollution by oil - and the problems which have to be solved before the Convention can be effectively implemented. The 1973 Convention is summarized and problems and solutions that arose from it are discussed."

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #4448-1Q8. 1978]

G. BIBLIOGRAPHIES

C-1439-78
OCEAN LAW (A BIBLIOGRAPHY WITH ABSTRACTS)
Brown, R.J. 1977.
Report NTIS/PS-77/0948. 315 p. Report for 1964-Oct 77. (Supersedes NTIS/PS-76/0834, NTIS/PS-75/712, and NTIS/PS-74/134.)

Bibliographies, Legislation, Oceans, Offshore drilling, Pollution control

"This bibliography cites national and international laws on fishing, undersea mining, shipping, dredging, territorial waters, navigation regulations, seafloor minerals, offshore drilling, and water pollution. (This updated bibliography contains 310 abstracts, 79 of which are new entries to the previous edition.)"

[from Government Reports Announcements 78(1):#NTIS/PS-77/0948/8GA. 1978]

C-1440-78
WASTE PROCESSING AND POLLUTION IN THE CHEMICAL AND PETROCHEMICAL INDUSTRIES. VOLUME 2. 1975-AUGUST 1977. (A BIBLIOGRAPHY WITH ABSTRACTS)
Cavagnaro, D.M. 1977.
Report NTIS/PS-77/0706. 352 p. Report for 1975-August 1977. (Supersedes NTIS/PS-76/0607, NTIS/PS-75/541, and NTIS/PS-74/118.)

Bibliographies, Wastewater treatment, Refineries, Petrochemicals, Industries, Economics, Pollution control

This updated bibliography contains 347 abstracts, 188 of which are new entries, covering control processes, emissions, economics, pollution effects, and abatement strategies pertaining to the title industries.

[from Government Reports Announcements 77(21):#NTIS/PS-77/0706/0GA. 1977]

C-1441-78
OFFSHORE DRILLING (A BIBLIOGRAPHY WITH ABSTRACTS)
Habercom, G.E., Jr. 1977.
Report NTIS/PS-77/0703. 193 p. Report for 1964-July 1977. (Supersedes NTIS/PS-76/0627, NTIS/PS-75/540, and NTIS/PS-74/103.)

Bibliographies, Offshore drilling, Oil wells, Environmental effects, Legislation, Equipment

This report contains 188 abstracts, 34 of which are new, covering drilling procedures, equipment, environmental aspects, and legal implications involved in oceanic mineral resources recovery.

[from Government Reports Announcements 77(21):#NTIS/PS-77/0703/7GA. 1977]

C-1442-78
OFFSHORE STRUCTURES (A BIBLIOGRAPHY WITH ABSTRACTS)
Habercom, G.E., Jr. 1977.
Report NTIS/PS-77/0716. 194 p. Report for 1964-July 1977. (Supersedes NTIS/PS-76/0626, NTIS/PS-75/684, and NTIS/PS-74/123.)

Bibliographies, Offshore development, Design-engineering, Environmental effects

This updated bibliography contains 189 abstracts, 39 of which are new entries, concerning the feasibility, design, construction, and environmental impact of offshore structures. [possibly oil pollution related]

[from Government Reports Announcements 77(21):#NTIS/PS-77/0716/9GA. 1977]

C-1443-78
CONTINENTAL SHELF DEVELOPMENT: A BIBLIOGRAPHIC BACKGROUND FOR ALASKA. VOLUME I, AND VOLUME II
Rosier, K. 1977.
Report PB-273 534, Grant NOAA-04-6-158-44029. 423 p. Final report.

Bibliographies, Offshore development, OCS, Onshore impacts, Alaska, Industries, Socioeconomic effects, Legislation

This bibliography contains 2176 citations on offshore oil development in Alaska and the related onshore impacts. The following categories are covered: 1) directories, encyclopedias, and indexes, 2) bibliographies and abstracts, 3) general works, 4) physical and earth sciences, 5) biological sciences, 6) technology, 7) industries, 8) pollution, 9) social and economic considerations, and 10) law and legislation.

[from Government Reports Announcements 78(2):#PB-273 534/8GA. 1978]

C-1444-78
OIL POLLUTION DETECTION AND SENSING. VOLUME 1. 1964 - 1975 (A BIBLIOGRAPHY WITH ABSTRACTS)
Smith, M.F. 1977.
Report NTIS/PS-77/0933. 214 p. Report for 1964-75.

Bibliographies, Monitoring, Detection, Sampling, Analytical techniques, Chemical analysis, Oil spills, *Industrial wastes

"Research on oil and hydrocarbon detection, sampling, and monitoring methods and instrumentation are cited. Techniques related to chromatography, infrared spectroscopy, light scattering, fluorescence, mass spectroscopy, and remote sensing are included. The majority of abstracts deal with oil spills; however, abstracts on oil detection in industrial wastes and sewage are also covered. (This updated bibliography contains 209 abstracts, none of which are new entries to the previous edition.)"

[from Government Reports Announcements 78(1):#NTIS/PS-77/0933/OGA. 1978]

C-1445-78
OIL POLLUTION DETECTION AND SENSING. VOLUME 2. 1976-NOVEMBER 1977 (A BIBLIOGRAPHY WITH ABSTRACTS)
Smith, M.F. 1977.
Report NTIS/PS-77/0934. 107 p. Report for 1976-Oct 77. (Supersedes NTIS/PS-76/0701, and NTIS/PS-75/595.)

Bibliographies, Sampling, Detection, Chemical analysis, Remote sensing, Analytical techniques, Oil Spills, *Industrial wastes

"Citations of research on sampling, detection, and chemical analysis of oil in water are presented. Studies on remote sensing principally using radar, ocean wave damping, and infrared detection are included. The classification, pattern recognition, luminescence, gas chromatography, and neutron activation analysis of oils are reported in these abstracts. The majority of these citations concern oil spills, but studies on oil wastes, industrial wastes, bilge water, and sewage are also covered. (This updated bibliography contains 102 abstracts, 76 of which are new entries to the previous edition.)"

[from Government Reports Announcements 78(1):#NTIS/PS-77/0934/8GA. 1978]

C-1446-78
OIL WATER SEPARATORS (A BIBLIOGRAPHY WITH ABSTRACTS)
Smith, M.F. 1977.
Report NTIS/PS-77/1004. 145 p. Report for 1964-Nov 77. (Supersedes NTIS/PS-76/0863, and NTIS/PS-75/710.)

Bibliographies, Oil-water separation, Equipment, Spill removal, Ballast, Bilges, Pollution control

Federally-sponsored research on the title equipment for oil pollution control is cited in 140 abstracts (19 new entries to previous editions). Operation, testing, and performance reports are given for these devices which include centrifuge separators, coalescers, filters, and skimmers. Oil recovery from oil spills and separation from ballast and bilge water are also covered.

[from Government Reports Announcements 78(2):#NTIS/PS-77/1004/9GA. 1978]

C-1447-78
THE SEA: A SELECT BIBLIOGRAPHY ON THE LEGAL, POLITICAL, ECONOMIC AND TECHNOLOGICAL ASPECTS, 1975-1976
United Nations. 1976.
New York, United Nations, 1976. 31 p. (UN ST/LIB/SER-B/21. Bibliogr. Series Dag Hammarskjold Library)

Bibliographies, Oceans, Legislation, Economics, UN, *Law of the Sea Conference

"This bibliography has been compiled for the Third United Nations Conference on the Law of the Sea held in New York, USA (15 Mar-7 May 1976). It is a supplement to the three bibliographies prepared by the Dag Hammarskjold Library for the second session of the Conference held in

1974 (Caracas, Venezuela). It covers the Library's holdings of monographic and periodical literature published since 1975."

[from Aquatic Sciences and Fisheries Abstracts, Part 1, 8(4): #3372-1Q8. 1978]

H. MISCELLANEOUS

C-1448-78
CHEMISTRY OF MARINE SEDIMENTS (book review)
Anon. 1978.
Environmental Pollution 16(3):241.

Sediments, Chemical analysis, Contaminants, Book review

The title book [Yen, T.F. (ed.). Ann Arbor, Michigan, Ann Arbor Science, 1977. vi + 265 p.] is recommended as "of interest to marine scientists in particular, and to environmentalists generally" for its study of an important, but relatively neglected topic. Besides describing the potential of sediments as energy and metal resources, it also discusses the way in which pollutants behave in the sediments. [possibly oil pollution related]

C-1449-78
GRZIMEK'S ENCYCLOPEDIA OF ECOLOGY
Grzimek, B., J. Illies, and W. Klausewitz. 1977.
New York, Van Nostrand Reinhold, 1977. 705 p.

Biological effects, Environmental effects, Development, *Encyclopedia

Approximately 50 contributors to this book illustrate the interactions between technological applications and living organisms. The book is divided into two sections entitled "The Environment of Animals" and "The Environment of Man." Included are chapters on the environmental crisis, animals in the changed environment, the sea in danger, and biological equilibrium. [possibly oil pollution related]

[from New Technical Books 62(9):#1564. 1977]

C-1450-78
PORT FACILITIES AND COMMERCE
Hammon, A. 1976.
MESA New York Bight Atlas. Monograph 20. 41 p.

Ports, Oil discharges, Safety, Deepwater ports, Development, New York

The Port of New York channel systems, navigation safety, major ocean terminal developments, harbor shoreline, and shipboard pollution are discussed. Discharge of ship pollutants, including oily wastes and sewage, into harbor waters are subject to federal law. The feasibility of deepwater oil terminals has been studied, but no facility is currently planned due to public concern for oil pollution and uncontrolled shoreline industrial development.

[from Oceanic Abstracts 14(6):#77-05853. 1977]

C-1451-78
SEDIMENTARY POLYCYCLIC AROMATIC HYDROCARBONS: THE HISTORICAL RECORD
Hites, R.A., R.E. LaFlamme, and J.W. Farrington. 1977.
Science 198(4319):829-831.

Sediments, Aromatic hydrocarbons, PAH, Sources, Fossil fuels, Buzzards Bay, Massachusetts, *Combustion

Analysis of a sediment core from Buzzards Bay, Massachusetts was performed by GC/MS. Comparison of "the absolute and relative concentrations of the unsubstituted PAH species and the relative abundances of the alkyl homologs" indicates that the source of the PAHs has been the same for the three dated sections (1850, 1900, 1970) with a marked increase in intensity between 1850 and 1900. The authors' conclusion that the source is the anthropogenic combustion of fossil fuels is consistent with previous studies. [possibly oil pollution related]

C-1452-78
INTEGRATED GLOBAL OCEAN STATION SYSTEM: GENERAL PLAN AND IMPLEMENTATION PROGRAMME 1977-1982
[Intergovernmental Oceanographic Commission]. 1977.
Intergovernmental Oceanographic Commission, 1977. 37 p. (Technical Series, 16)

Monitoring, Remote sensing, Pollution prevention

The title System (IGOSS) plans are presented and discussed. Phase II outlines the expansion and improvements of the new plans by the monitoring of marine pollutants, the incorporation of oceanographic data gathered via satellites and buoys, the automation of shipboard observing techniques, and the implementation of a synoptic analysis and prediction system. [possibly oil pollution related]

[from Oceanic Abstracts 15(2):#78-01986. 1978]

C-1453-78
HYDROGRAPHIC CONDITIONS IN HARIMANADA OF THE SETO INLAND SEA WITH REFERENCE TO CHEMICAL ELEMENTS AND PLANKTON IN FEBRUARY 1975 [English summary]
Kuroda, K., N. Baba, and H. Takahashi. 1976.
Umi To Sora 51(3-4):51-64.

Sampling, Monitoring, Plankton, Japan, *Hydrology, *Seto Inland Sea

Oceanographic observations were conducted to determine the basic hydrology in the title area which was extremely polluted by an oil outflow accident at Mizushima on December 18, 1974. Observations were carried out on board the Shumpu Maru III of the Kobe Marine Observatory on February 25-26, 1975. Some distributional properties of observed elements are reported.

[from Oceanic Abstracts 14(6):#77-05690. 1977]

C-1454-78
FUEL AND THE ENVIRONMENT. X. [in Japanese]
Watanabe, S. 1977.
Nenryo Oyobi Nensho 44(10):922-932.

Fuels, Environmental effects, *Review

"A review with 10 references." [possibly oil pollution related]

[from Chemical Abstracts 88(26):#193994a. 1978]

C-1455-78
FUEL AND THE ENVIRONMENT. XI. [in Japanese]
Watanabe, S. 1977.
Nenryo Oyobi Nensho 44(11):1014-1026.

Fuels, Environmental effects, *Review

"A review with 17 references." [possibly oil pollution related]

[from Chemical Abstracts 88(26):#193993z. 1978]

SECTION II: CURRENT RESEARCH PROJECTS

Title, contract information, and a summary of project objectives are provided in each entry. Sources of project notices include: The Smithsonian Science Information Exchange (SSIE); API Environmental Research Annual Status Report; Maritime Research Information Service Abstracts; Scientific and Technical Aerospace Reports; Department of Environment, Canada, Spill Technology Newsletter; Northwest and Alaska Fisheries Center Monthly Report; and written inquiries to organizations and researchers. Current status information and publications resulting from the projects are presented when such information is available from the principal investigators or performing organizations. The source of status information is given at the end of each entry.

Entries are grouped according to subject and then ordered sequentially with a citation number R-   -78. Some of the projects listed in previous Oil Pollution Reports have been recently renewed. These projects have been relisted with a current serial number, followed by the original number in parentheses. To locate the original entry, refer to the following list:

Citation Numbers	Dates Covered	Report Number
R-001-74 to R-165-74	July 74 - Oct. 74	EPA-670/2-75-003
R-166-74 to R-244-74	Nov. 74 - Feb. 75	EPA-670/2-75-044
R-245-74 to R-268-74	Feb. 75 - Apr. 75	EPA-670/2-75-059
R-269-74 to R-342-74	May 75 - July 75	EPA-600/2-76-129
R-269-75 to R-304-75	Aug. 75 - Oct. 75	EPA-600/2-76-113
R-001-76 to R-035-76	Nov. 75 - Jan. 76	EPA-600/2-76-185
R-036-76 to R-063-76	Feb. 76 - Apr. 76	EPA-600/2-76-215
R-064-76 to R-123-76	May 76 - July 76	EPA-600/2-76-266
R-124-76 to R-175-76	Aug. 76 - Oct. 76	EPA-600/2-77-037
R-001-77 to R-022-77	Nov. 76 - Jan. 77	EPA-600/2-77-075
R-023-77 to R-039-77	Feb. 77 - Apr. 77	EPA-600/2-77-111
R-040-77 to R-075-77	May 77 - July 77	EPA-600/2-77-243
R-076-77 to R-096-77	Aug. 77 - Oct. 77	EPA-600/2-78-005
R-001-78 to R-020-78	5(1) Nov. 77 - Jan. 78	EPA-600/2-78-071
R-021-78 to R-057-78	5(2) Feb. 78 - May 78	EPA-600/7-78-160
R-058-78 to R-150-78	5(3) Jun. 78 - Sep. 78	Submitted 10/78

A. OIL POLLUTION DETECTION AND EVALUATION

1. MONITORING

R-151-78

PRINCE WILLIAM SOUND HYDROCARBON MONITORING

Principal Investigator: MacLeod, W.
Performing Organization: US Dept. of Commerce, Environmental Conservation Division, 2725 Montlake Blvd. E, Seattle, WA 98112
Supporting Organization: US Dept. of Commerce, NOAA, NMFS, Washington, DC. No. NWC-035
Period: 10/77 - 9/78
Funds: $8,320

Monitoring, Aromatic hydrocarbons, Hydrocarbons, Seawater, Sediments, Mollusks, Sampling

"Port Valdez and Prince William Sound are being monitored for saturated and aromatic hydrocarbon levels in water, sediments, and mussels. Six sites will be sampled in the spring, summer, and fall of 1978."

[SSIE No. ZBP-1498]

2. ANALYSIS

R-152-78

CHARACTERIZATION OF REFRACTORY ORGANICS OF POSSIBLE CARCINOGENIC SIGNIFICANCE IN RECYCLED WASTEWATER

Principal Investigator: Burbank, N.C. and R.E. Green
Performing Organization: University of Hawaii, Water Resources Research Center, 2540 Dole St., Room 283, Honolulu, HI 96822
Supporting Organization: US Dept. of the Interior, Office of Water Research & Technology, 19th & C Sts. NW, Washington, DC 20240. No. A-058-HI
Period: 7/75 - 12/77
Funds: $7,439

Chemical analysis, Wastewaters, Recycling, Carcinogens, Chromatography, *IR Spectrography, *Organics

By carbon adsorption and selective solvent extraction techniques, this study will remove organics from treated sewage prepared for recycling for irrigation and ground recharge. A more exact character of the organic compounds will be determined by gas and thin layer chromatography, and infrared spectrography. "Gross determinations have developed that these may be terpenes and compounds resembling, to a degree, carcinogens." [possibly oil pollution related]

[SSIE No. GUY-381-2]

R-153-78 (R-002-76)

HYDROCARBON STUDIES IN PUGET SOUND AND OFF THE WASHINGTON COAST

Principal Investigator: Carpenter, R.
Performing Organization: University of Washington, School of Arts & Sciences, C301 Health Sciences Building, Seattle, WA 98105
Supporting Organization: US Dept. of Energy, Division of Biomedical & Environmental Research, 1717 H St. NW, Washington DC 20545. No. 008014
Period: 6/75 - 1/80
Funds: Unknown

Chemical analysis, Hydrocarbons, Plankton, Neuston, Sediments, Sampling, Puget Sound, Washington

This research project will collect samples of phytoplankton, zooplankton, neuston, and sediment cores; extract hydrocarbons from the samples; and perform analyses by GC, high pressure LC, UV fluorescence spectroscopy, mass spectroscopy, GC/MS, and /Sup 14/C/ /Sup 12/C and /Sup 13/C/ /Sup 12/C ratios.

[SSIE No. GPE-5809-2]

R-154-78 (R-042-77)

CHEMICAL INTERACTION OF ATMOSPHERIC PETROLEUM RESIDUES WITH LAKE SURFACE ORGANIC MICROLAYERS

Principal Investigator: Eisenreich, S.J.
Performing Organization: University of Minnesota, School of Engineering, 105 Morrill Hall, Minneapolis, MN 55414
Supporting Organization: American Chemical Society, 1155 16th St. NW, Washington, DC 20036. No. 9116-G517
Period: 9/76 - 8/79
Funds: $3,000

Chemical analysis, Lakes, GC/MS, *Atmospheric petroleum residues, PAH

The objective of this research is to investigate the chemical interaction of petroleum residues (PR) originating from atmospheric and in-lake sources with surface organic microlayers (SOM) in freshwater lakes. GC/MS techniques and IR spectroscopy will be used in quantifying and identifying petroleum residues. Ultimately, the effect of atmospheric inputs of PR and enrichment in SOM will be related to the accumulation of hydrocarbon-soluble hazardous organics (PCB's, pesticides, PAH) in aquatic systems.

[SSIE No. PCS-2607-2]

R-155-78
NAVY ENVIRONMENT: NEW ANALYTICAL METHODS

Principal Investigator: Hieftje, G.M.
Performing Organization: Indiana University, School of Arts & Sciences, Memorial Hall, Bloomington, IN 47401
Supporting Organization: US Dept. of Defense, Navy, Office of Naval Research, 800 N. Quincy St., Arlington, VA 22217. Contract DN675628, N00014-76-C-0838
Period: 5/76 - Continued
Funds: $40,412

Analytical techniques, Detection, Residual oils, Seawater, USN

Enhanced analytical capabilities are required in the Navy for several areas including analysis of environmental samples such as seawater and oil residues. This project will investigate instrumentation for rapid multielement analysis based on atomic absorption and emission spectroscopy, examine various methods of signal processing to handle background corrections and spectral interference, and measure detection limits and sensitivities for a large number of elements.

[SSIE No. GQN-675628-1]

R-156-78 (R-070-76)
MARINE CHEMICAL PROCESSES

Principal Investigator: Wasik, S.P.
Performing Organization: US Dept. of Commerce, National Bureau of Standards, Washington, DC 20234
Supporting Organization: Same as above. No. 3163136
Period: 10/76 - 12/79
Funds: $155,000

Contaminants, Fossil fuels, Solubility, Chemical analysis, Analytical techniques, Source identification, *Organic compounds

The project objectives are: to measure solubility of organic compounds in water; to measure partitioning of organic compounds in water with other phases in the marine environment (e.g., lipids, sediments, and atmosphere); to measure vapor pressure of organic compounds; and to develop new techniques for determining and identifying trace amounts of contaminants in water. One of the results of this research will be the realization of a method for sub-minute fingerprinting and quantification of fossil fuels, using a modified mass spectrometry analysis.

[SSIE No. ZBA-7040-2]

R-157-78 (R-026-78)

IN SITU POLLUTANT MEASUREMENTS

Principal Investigator: Wogman, N.A.
Performing Organization: US Dept. of Energy, Battelle Pacific NW Lab., PO Box 999, Richland, WA 99352
Supporting Organization: US Dept. of Energy, Div. of Biomedical & Environmental Research, 1717 H St. NW, Washington, DC 20545. No. 001287
Period: 10/76 - N/A
Funds: Unknown

Contaminants, Sediments, Ecosystems, Seawater, Freshwater, Analytical techniques, *In situ analysis

"Three areas will be emphasized: 1) in situ analysis of toxic trace elements; 2) in situ analysis of radionuclides; and 3) in situ analysis of organic pollutants.... Depth profile capabilities will be improved to allow in situ analysis of energy-related pollutants which have been deposited over a period of tens of years. Carbon and Ni pollutants from oil-related materials will be measured with a portable 14 MeV neutron generator. This program allows the in situ analysis of pollutants in sediments and therefore allows studies of the stress of ecosystems within well characterized marine and fresh water environments."

[SSIE No. ZPE-11589-2]

B. OIL POLLUTION PREVENTION AND CONTROL

1. CLEANUP AND REMOVAL

R-158-78 (R-136-78)
SOLUBILIZATION AND BIODEGRADATION OF HYDROCARBONS

Principal Investigator:	Barnett, S.M, C.W. Houston, and A.R. Thompson
Performing Organization:	University of Rhode Island, School of Engineering, Administration Bldg., Wakefield, RI 02881
Supporting Organization:	US Dept. of the Interior, Office of Water Research & Technology, 19th & C Sts. NW, Washington, DC 20240. No. B-073-RI
Period:	7/78 - 9/78
Funds:	Unknown

Hydrocarbons, Surfactants, Biodegradation, Wastewater treatment, Spill cleanup, *Solubilization

The proposed study will concentrate on the transport of hydrocarbons through the aqueous media, which is believed to be the rate controlling factor in the treatment of hydrocarbons. The investigator will identify surfactant characteristics which promote hydrocarbon solubilization, transport and biodegradation, and suggest surfactants for use in waste treatment plants and in natural environments.

[SSIE No. GUY-523-2]

R-159-78
GRAFT POLYMERS OF STARCH FOR AGRICULTURAL CHEMICALS AND ABSORBENTS

Principal Investigator:	Fanta, G.F. and W.M. Doane
Performing Organization:	US Dept. of Agriculture, Cereal Products Lab, 1815 N. University St., Peoria, IL 61604
Supporting Organization:	US Dept of Agriculture, Agricultural Research Service, Northern Regional Research Center, 1815 N. University St., Peoria, IL 61604. No. 0043849, 3102-20540-025
Period:	6/77 - 6/82
Funds:	Unknown

Hydrocarbons, Absorption, Spill cleanup, *Starch polymers

The objectives of this research are to: "exploit principles elaborated in the successful development of hydrophilic starch polymers (Super Slurper) by preparing starch polymers for agricultural uses, absorption of hydrocarbons (oil spills), and extruded or molded plastics and rubbers; and [to] elucidate structure-property relationships for starch-based polymers."

[SSIE No. GY-43849]

R-160-78 (R-048-77)

SURFACE TREATMENT AGENTS FOR SHORELINE PROTECTION

Principal Investigator: Foget, C.R.
Performing Organization: American Petroleum Institute, 2101 L St. NW, Washington, DC 20037
Supporting Organization: US Environmental Protection Agency, Office of R & D, Industrial Environmental Research Lab, 5555 Ridge Ave., Cincinnati, OH 45268. No. R804639-02, B746-001
Period: 8/76 - 8/78
Funds: $79,000

Beach cleanup, *Surface treatment agents, Surfactants, Dispersants, Environmental protection, *Field tests

A literature review was conducted, and preliminary field tests of surface treatment agents were performed for agent effectiveness, toxicity, and application techniques on salt-marsh sections and simulated beaches. The agents tested were film-forming agents, surfactant/dispersing agents, a surfactant/collecting agent, and a flowing film of water. The results of the preliminary field tests recommended two film-forming agents, polyvinyl acetate and xanthan gum, and the surfactant/collecting agent, Shell Oil Herder, for full-scale field tests.

[SSIE No. GMA-4822]

2. WASTE TREATMENT AND DISPOSAL

R-161-78

BIOLOGICAL EVALUATION OF "BEST PRACTICABLE" & "BEST AVAILABLE" TREATMENT CONTROL TECHNOLOGIES APPLIED TO PETROLEUM REFINERY WASTEWATERS

Principal Investigator: Burks, S.L.
Performing Organization: Oklahoma State University, School of Arts & Sciences, Agriculture Hall, Stillwater, OK 74075
Supporting Organization: US Dept. of the Interior, Office of Water Research & Technology, 19th & C Sts. NW, Washington, DC 20240
Period: 7/75 - N/A
Funds: Unknown

Wastewater treatment, Refineries, Bioassay, Marine organisms

"Proposed technologies for treatment of petroleum refinery wastewaters were evaluated for effectiveness in removing toxic components by biological assays with fathead minnows, benthic macroinvertebrate organisms and periphyton. This project is also supported by: Oklahoma Oil Refiners Waste Control Council."

[SSIE No. GUY-937-1]

R-162-78 (R-083-78)
LAND APPLICATION OF INDUSTRIAL WASTES
Principal Investigator: Overcash, M.R., and P.W. Westerman
Performing Organization: University of North Carolina, School of Agriculture and Life Sciences, Raleigh, NC 27607
Supporting Organization: US Dept. of the Interior, Office of Water Research & Technology, 19th & C Sts. NW, Washington, DC 20240. No. B-100-NC
Period: 7/78 - 12/78
Funds: $16,748

Wastewater treatment, Industries, Refining, *Land application

"The proposal objectives are: (1) to coordiante available fundamental and field scale information with actual treatment mechanisms and calculations to determine land loading rates for wastewater constituents of several industry categories [textiles, seafood processing, and petroleum refining]; (2) to optimize the end-of-the-pipe data of objective (1) by including pretreatment unit processes which precede the plant-soil receiver so that minimum cost is achieved for the total system and maximum advantage is gained from the land receiver."

[SSIE No. GUY-789-2]

3. OIL-WATER SEPARATION

R-163-78 (R-281-75)
SEPARATION OF FREE OIL FROM WATER FOLLOWING COALESCENCE
Principal Investigator: Gloyna, E.F., and C.J. Wu
Performing Organization: University of Texas, School of Engineering, 200 W. 21 St., Austin, TX 78712
Supporting Organization: University of Texas, 601 Colorado St., Austin, TX 78701
Period: 1/77 - N/A
Funds: Unknown

Oil-water separation, Coalescence, Models, *Evaluations

Six oil-water separators were evaluated with emphasis on oil removal efficiency and headloss. Laboratory results indicate that Model I was effective under low flow rate conditions, and Model VI was successful under high flow rate conditions. Oil concentrations were reduced from 50 mg/L to 1 mg/L, or 98% removal; and coalescence occurred using a polyester mat and a flow rate of 6.8 Lps/m^2 (10 gpm/ft^2).

[SSIE No. NTX-908]

4. CONTINGENCY PLANNING

R-164-78
NATIONAL OIL SPILLS
Principal Investigator: Robinson, J.
Performing Organization: US Dept. of Commerce, Environmental Research Labs, Boulder, CO 80302
Supporting Organization: US Dept. of Commerce, NOAA, Environmental Research Labs, Boulder, CO 80302. No. 87121488
Period: 3/78 - 9/78
Funds: $82,680

Contingency planning, Oil spills, US,*Research funds

This project has been established to hold money for studies of spills that might occur in the US during 1978. These funds will be transferred to a specific project for each spill occurrence.

[SSIE No. ZBP-1447]

C. ASPECTS OF OIL POLLUTION

1. BIOLOGICAL ASPECTS

R-165-78
THE EFFECTS OF SUBLETHAL LEVELS OF HEAT AND OIL ON THE BEHAVIOR OF AQUATIC ANIMALS
Principal Investigator: Atema, J.
Performing Organization: Boston Univeristy, School of Arts & Sciences, 881 Commonwealth Ave., Boston, MA 02215
Supporting Organization: US Dept. of Energy, Division of Biomedical & Environmental Research, 1717 H St. NW, Washington, DC 20545. No. 006967
Period: 1/76 - N/A
Funds: Unknown

Fuel oil, Marine organisms, *Heat, Sublethal effects, Behavior, *Chemoreception, Models

Alterations in feeding and social behavior of test organisms will be measured to determine pollutant effects, and changes in neurophysiological responses of chemoreceptors will be monitored to understand the mechanism of action on the organism. *Nassarius obsoletus*, *Homarus americanus*, and *Ictalurus nebulosus* will be exposed to the following pollutants: 1) No. 2 fuel oil; whole oil and oil fractions at concentrations from 10 ppm to 50 ppm, and 2) heat; applied in 5° C increases over baseline values from 10-30° C. "Changes in behavior may be the essential areas to be reflected at the population level and effects on chemoreception may be generalized across different species. If such a generalized model of oil interference proves to be valid, realistic safety standards can be set up based on these experimental data."

[SSIE No. GPE-5593-3]

R-166-78 (R-092-78)
EFFECTS OF PETROLEUM HYDROCARBONS ON MARINE ORGANISMS
Principal Investigator: Caldwell, R.S.
Performing Organization: Oregon State Higher Educ. Sys., Agricultural Experiment Station, 126 Agriculture Hall, Corvallis, OR 97331
Supporting Organization: Oregon State Government, 240 Cottage St. SE, Salem, OR 97310. No. 0072451, ORE00365
Period: 10/77 - 9/78
Funds: Unknown

WSF, Crude oil, Petroleum products, Toxicity, Marine organisms

The relative toxicity of the principal water extractable hydrocarbons of crude and refined oils will be determined, and the contribution of each to the toxicity of WSFs of oil will be evaluated. The possibility that some of the hydrocarbon components may have synergistic toxicity when present together in WSFs will also be examined. The study will test the hypothesis that "hydrocarbon compounds capable of inducing the mixed function oxidase enzymes of the endoplasmic reticulum interfere with the adaptive responses of poikilothermic marine organisms to temperature by the interference with the activity of the fatty acid desaturate enzyme system."

[SSIE No. GY-72451]

R-167-78

RELATION BETWEEN HYDROCARBON CONTAMINATION AND TUMORS IN MYA ARENARIA

Principal Investigator:	Dow, R.L, J.W. Hurst, E. Gilfillan, S. Hanson, et al.
Performing Organization:	State Dept. of Marine Resources, State House Annex, Augusta, ME 04333
Supporting Organization:	US Environmental Protection Agency, Office of R & D, Environmental Research Lab, S. Ferry Rd., Narragansett, RI 02882. No. R804745-01, P608C-31
Period:	9/77 - 9/78
Funds:	$100,000

Fuel oil, Mollusks, Biological effects, *Tumors, *Mya arenaria, Maine

The purpose of this study is to determine whether or not there is a causal relationship between a March 1971 oil spill into a Mya arenaria growing area at Long Cove, Searsport, Maine and the continuing development of tumors in the surviving clam population.

[SSIE No. GMA-4830]

R-168-78

OIL AND THE OYSTER INDUSTRY IN THE DELAWARE ESTUARY

Principal Investigator:	Haskin, H.H.
Performing Organization:	Rutgers the State University, Agricultural Experiment Station, Old Queens Bldg., New Brunswick, NJ 08903
Supporting Organization:	New Jersey State Government, 1035 Parkway Ave., Trenton, NJ 08625. No. 0072771, NJ00782
Period:	10/77 - 9/78
Funds:	Unknown

Hydrocarbons, Petroleum products, Mollusks, Toxicity, Bioassay, Delaware Bay, Estuaries, *Oyster industry

The purpose of this study is to assess present hazards in the Delaware Bay to oyster production, estimate possible additional hazards of expanded petroleum-related operations in the area, and identify substances particularly toxic to oysters. Bioassays for adult oysters and larvae will be performed with petroleum and its products, and heavy metals. Possible synergism between heavy metals and petroleum hydrocarbons will be examined.

[SSIE No. GY-72771]

R-169-78

CONTAMINANT EFFECTS ON LIFE PROCESSES

Principal Investigator: Hodgins, H.
Performing Organization: US Dept. of Commerce, Environmental Conservation Division, 2725 Montlake Blvd. E, Seattle, WA 98112
Supporting Organization: US Dept. of Commerce, NOAA, NMFS, Washington, DC. No. NWC-032
Period: 10/77 - 9/78
Funds: $1,664

Fish, Marine organisms, Biological effects, Behavior, *Chemoreception, Pacific Ocean

Immediate objectives for this project are to: "1) determine nature and incidence of diseases of marine fishes and invertebrates of the North Pacific; 2) determine effects of petroleum on fish health; 3) identify populations of salmon and demersal marine fish; and 4) determine effects of petroleum on behavioral and chemosensory modalities in selected Pacific marine species."

[SSIE No. ZBP-1486]

R-170-78

ENVIRONMENTAL IMPACTS - PHYSIOLOGY - BIOASSAY

Principal Investigator: Karinen, J.
Performing Organization: US Dept. of Commerce, Auke Bay Fisheries Lab, PO Box 155, Auke Bay, AK 99821
Supporting Organization: US Dept. of Commerce, NOAA, NMFS, Washington, DC. No. NWC-301
Period: 10/77 - 9/78
Funds: $178,600

WSF, Crude oil, Marine organisms, Toxicity, Bioassay, Chemical analysis, Alaska

This study will expose a variety of Alaskan species to oil and will investigate: 1) acute and sublethal bioassays, 2) the effects of pollutants on behavior, and 3) the sublethal effects measured by several physiological parameters. Detailed chemical monitoring (UV, IR, and GC) of test solutions is stressed. Emphasis is placed on determining the relative importance of toxic components in the WSF of crude oil, using static and flow-through tests to compare the short- and long-term effects. Future emphasis will be on larval studies.

[SSIE No. ZBP-1509]

R-171-78 (R-010-78)
MEMBRANE TOXICITY THEORY AND ENVIRONMENTAL POLLUTANTS

Principal Investigator:	Kinter, W.B., D.S. Miller, D.B. Peakall, and R.G. Butler
Performing Organization:	Mount Desert Island Biol. Lab., Old Bar Harbor Rd., Salsbury Cove, ME 04672
Supporting Organization:	US Dept. of Health, Education & Welfare, Public Health Service; National Inst. of Health, National Inst. of Environmental Health Sciences, PO Box 12233, Research Triangle Park, NC 27709. No. R01 ES 00920-06
Period:	6/77 - 5/79
Funds:	$60,380

Hydrocarbons, Toxicity, Birds, Fish, Health hazards, *Altered membrane

"The immediate objective is comprehensive physiological-biochemical-morphological evaluation of the effects of heavy metal, petroleum and organochlorine pollutants on osmoregulatory and nutritive membrane functions in selected species of aquatic birds and fish." The long-term objective is the evaluation of the role of altered membrane as one of the primary mechanisms of pollutant toxicity. The cell membrane theory of toxicity is an approach to: 1) explaining toxicities of known pollutants; 2) designing indicator tests for environmental warning; and 3) predicting future health hazards including synergistic effects. Current work focuses on petroleum and a new technique for working with seabird nestlings in the field.

Reports and Publications

CRUDE OIL INGESTION: SUB-LETHAL EFFECTS IN HERRING GULL CHICKS
Miller, D.S., D.B. Peakall, and W.B. Kinter. 1978.
Science 199(4326):315-317.

For summary see OPR 5(2):#C-0565-78.

POLLUTANT TOXICITY IN SEA BIRDS: EVALUATION OF A NEW EXPERIMENTAL APPROACH
Miller, D.S., D.B. Peakall, and W.B. Kinter. 1978.
Federation Proceedings Vol. 37:248.

[SSIE No. 1ES-920-6]

R-172-78

EVALUATION OF THE ACUTE TOXICITY OF SECONDARILY TREATED OIL REFINERY EFFLUENTS TO FISH

Principal Investigator: Kleinholz, C.W., and S.L. Burks
Performing Organization: Oklahoma State University, Graduate School, 211-215 Whitehurst Hall, Stillwater, OK 74075
Supporting Organization: Oklahoma Oil Refinery & Waste Control Council, PO Box 2039, Tulsa, OK 74102
Period: 1/77 - N/A
Funds: Unknown

Acute effects, Toxicity, Bioassay, Refineries, Wastewaters, Fish, *Mobile laboratory

"A mobile bioassay laboratory trailer equipped for performance of state and continuous-flow bioassays is used for on-site toxicity evaluation of oil refinery effluents and effectiveness of treatment technologies."

[SSIE No. DH-92]

R-173-78

BIOLOGY - CHEMISTRY

Principal Investigator: Larrance, J.
Performing Organization: US Dept. of Commerce, Environmental Research Labs, Boulder, CO 80302
Supporting Organization: US Dept. of Commerce, NOAA, Environmental Research Labs, Boulder, CO 80302. No. 87131728
Period: 10/77 - 9/78
Funds: $315,000

Biological effects, Chemical effects, Chronic effects, Contamination

The main project objective is to initiate and develop plans and research pertinent to a future "long-range effects" program. Current work is in support of biological and chemical research pertaining to timely environmental issues such as oil pollution.

[SSIE No. ZBP-1348]

R-174-78

FACTORS WHICH UNDERLIE THE EFFICIENCY AND FUNCTIONING OF THE PROCESSES COUPLING MATERIALS AND ENERGY IN BENTHIC MARINE FOOD WEBS

Principal Investigator: Lee, J.J.
Performing Organization: City University of New York, School of Arts & Sciences, Convent Ave. & 138 St., New York, NY 10031
Supporting Organization: US Dept. of Energy, 17th & Pennsylvania Ave. NW, Washington, DC 20006. No. COO-3254
Period: 9/73 - Continued
Funds: $150,000

Food web, Ecosystems, Benthos, Coasts, Fisheries, Marshes

The proposed research focuses on the identification and characterization of the processes by which energy and materials are channeled through lower and intermediate steps of the marine detrital food web. This food web links the primary production of marsh and sea grasses to the secondary production which underlies many of our coastal fisheries. Seven sub-projects comprise this three-year project; one of these consists of field and laboratory experiments aimed at studying the effects which chronic stresses of various kinds (including crude oil and petrochemicals) impose on the initial colonization and decomposition of community trajectories and function. One of the field areas selected for study is an oil-soaked marsh at Winsor Cove, Bourne, Massachusetts, and a nearby control site.

[SSIE No. DI-52-1]

R-175-78 (R-058-77)
SUBLETHAL BIOCHEMICAL EFFECTS OF CONTAMINANTS

Principal Investigator:	Malins, D.C.
Performing Organization:	US Dept. of Commerce, Environmental Conservation Div., 2725 Montlake Blvd. E, Seattle, WA 98112
Supporting Organization:	US Dept. of Commerce, NOAA, NMFS, 9450 Gandy Blvd., St. Petersburg, FL 33702. No. NWC-031
Period:	10/77 - 9/78
Funds:	$346,000

Hydrocarbons, Fish, Sublethal effects, Contaminants, Metabolism, *Biochemical effects

This project proposes to determine the impact of petroleum hydrocarbons and their metabolites on various life stages of pelagic fish, flatfish, and shellfish. The research will include studies on the following: exposure of organisms to multiple pollutants; the mechanisms by which the organisms respond and/or adapt to exposure; synergistic-antagonistic actions that occur in the presence of a number of "ubiquitous contaminants" including petroleum hydrocarbons; the role of mucus in the response to aromatic hydrocarbons; and the effect of metabolites from both PCB's and petroleum hydrocarbons on biochemical mechanisms.

[SSIE No. ZBP-916-3]

R-176-78

BIOLOGICAL INDICATORS OF ENVIRONMENTAL INSULTS TO AQUATIC RESOURCES

Principal Investigator: Mayer, F.L.
Performing Organization: US Dept. of the Interior, Fish & Wildlife Service, Route #1, Columbia, MO 65201
Supporting Organization: US Dept. of the Interior, Fish & Wildlife Service, Div. of Fishery Research, 19th & C Sts. NW, Washington, DC 20240. No. 86410-921
Period: 10/77 - 9/78
Funds: $157,800

Bioindicators, Contaminants, *Aquatic organisms, Biological effects, Resource management

Much of the laboratory research involving the impact of environmental pollutants, including oil spills, on aquatic organisms, lacks field verification and the true impact of contaminants in the wild is poorly understood. "To adequately assess the influence of contaminants on the aquatic environment, techniques are desirable that can be used as biological indicators or predictors in the field for estimating the 'health' of a particular resource. The development of biological indicators and predictors will require detailed research into growth and development, reproduction, stress adaptation, and behavior of aquatic plants, invertebrates, and fish." Results of this research will be applied to field monitoring programs of the Field Research Units and to providing the Field Research Coordination Unit with the technical ability to detect and analyze present and future pollutant effects on aquatic resources.

[SSIE No. ZUV-291]

R-177-78

ECOLOGICAL AND PHYSIOLOGICAL/TOXICOLOGICAL EFFECTS OF OIL ON BIRDS

Principal Investigator: Stickel, L.F.
Performing Organization: US Dept. of the Interior, Fish & Wildlife Service, Laurel, MD 20811
Supporting Organization: US Environmental Protection Agency, Office of Energy, Minerals & Industry, 401 M St. SW, Washington, DC 20460. Interagency No. D7-E685, V625A-82
Period: 1/77 - N/A
Funds: $440,000

Biological effects, Crude oil, Hydrocarbons, Toxicity, Birds, Reproduction, Sublethal effects, Uptake, *Eggs

Objectives of the project are "to evaluate the effects on birds of exposure to petroleum and/or components by dietary intake or by exposure of eggs. Effects measured include physiological functions, reproductive performance, survival, and tissue accumulation."

[SSIE No. GMA-4773]

R-178-78

EFFECTS OF HYDROCARBONS ON DEFENSE MECHANISMS

Principal Investigator: Tripp, M.R.
Performing Organization: University of Delaware, School of Arts & Sciences, Newark, DE 19711
Supporting Organization: US Dept. of Health, Education & Welfare, Public Health Service, National Institute of Health, National Inst. of Environmental Health Sciences, PO Box 12233, Research Triangle Park, NC 27709. No. R01 ES 01531-02
Period: 4/77 - 3/79
Funds: $59,321

WSF, Hydrocarbons, Mollusks, Crustaceans, Fish, Biological effects, Sublethal effects, Toxicity, *Defense mechanisms

Three animal species will be studied to show how hydrocarbons adversely affect them, by causing disease and by making organisms more susceptible to disease. Histological and physiological effects will be studied after the hard clam (*Mercenaria mercenaria*), blue crab (*Callinectes sapidus*), and mummichog (*Fundulus heteroclitus*) are chronically exposed to nonlethal concentrations of phenol, naphthalenes, and water soluble petroleum extracts.

[SSIE No. 1ES-1531-2]

R-179-78 (R-050-78)

FATE AND EFFECTS OF PETROLEUM HYDROCARBONS IN MARINE COASTAL ECOSYSTEMS

Principal Investigator: Vanderhorst, J.R.
Performing Organization: US Dept. of Energy, Battelle Pacific NW Lab, PO Box 999, Richland, WA 99352
Supporting Organization: US Dept. of Energy, Div. of Biomedical & Environmental Research, 1717 H St. NW, Washington, DC 20545. No. 000838
Period: 1/78 - N/A
Funds: Unknown

Hydrocarbons, Bioassay, Bioindicators, Chronic effects, Analytical techniques, Fate, Ecosystems, Intertidal zone

"A continuous-flow petroleum metering system for bioassay work has been developed and tested using chemical measurement methods and bioassay organisms. Preliminary tests and a six-month continuous exposure have been conducted using a No. 2 fuel oil and field-colonized artificial substrates. Minimally the approach provides a highly efficient screening device to determine oil-sensitive species. It is anticipated that the study will be extended to other oils and that the resulting community structures will be diagnostic of oil contamination."

[SSIE No. ZPE-11592-2]

R-180-78

POLLUTANT FLOW THROUGH THE MARINE FOOD WEB

Principal Investigator:	Young, D.R.
Performing Organization:	Southern California Coastal Water, 1500 E. Imperial Hwy., El Segundo, CA 90245
Supporting Organization:	US National Science Foundation, Div. of Advanced Environmental Research & Technology, 1800 G. St. NW, Washington, DC 20555. No. ENV77-15376
Period:	2/78 - 7/79
Funds:	$69,980

Wastewaters, Contaminants, Hydrocarbons, Food web, Marine organisms, California, *Pollutant flow

A major purpose of this project is to test the assumption that toxic pollutants, including petroleum hydrocarbons, move upward through the marine food web, becoming more concentrated with each increase in trophic level. This project is pursuing field studies off the coast of Southern California to determine if structured food webs exist in a major wastewater disposal zone, and to what extent pollutant concentrations in several classes follow any structure that is identifiable. Various species at different life stages are being collected from control sites and in the disposal zone and analyzed for a number of inorganic and organic contaminants, including petroleum derivatives. These and other data will serve as the basis for examining the food chain amplification concept.

[SSIE No. GSQ-1904]

2. GENERAL ASPECTS

R-181-78

ARGO MERCHANT

Principal Investigator:	Robinson, J.
Performing Organization:	US Dept. of Commerce, Environmental Research Labs, Boulder, CO 80302
Supporting Organization:	US Dept. of Commerce, NOAA, Environmental Research Labs, Boulder, CO 80302. No. 87121482
Period:	3/78 - 9/78
Funds:	$90,000

Chemical analysis, Sampling, Argo Merchant spill, Chronic effects, Environmental effects

The main objective of this project is to determine effects of the *Argo Merchant* oil spill from samples taken over an adequate time period following its grounding and breakup. Current plans call for the analysis of samples collected over a period of several months.

[SSIE No. ZBP-1456]

R-182-78
BARGE 250 GASOLINE SPILL

Principal Investigator: Robinson, J.
Performing Organization: US Dept. of Commerce, Environmental Research Labs, Boulder, CO 80302
Supporting Organization: US Dept. of Commerce, NOAA, Environmental Research Labs, Boulder, CO 80302. No. 87121483
Period: 3/78 - 9/78
Funds: $17,320

Environmental effects, Gasoline, *Barge 250 spill, Rhode Island, Sampling, Chemical analysis

The project objective is to analyze the effects of a gasoline spill from the Barge 250 off the coast of Rhode Island, March 1978. Current plans include sampling and analysis of samples taken at the spill site.

[SSIE No. ZBP-1448]

R-183-78
FRENCH OIL SPILL

Principal Investigator: Robinson, J.
Performing Organization: US Dept. of Commerce, Environmental Research Labs, Boulder, CO 80302
Supporting Organization: US Dept. of Commerce, NOAA, Environmental Research Labs, Boulder, CO 80302. No. 87121481
Period: 3/78 - 9/78
Funds: Unknown

Oil spills, France

Summary not available.

[SSIE No. ZBP-1455]

D. ASPECTS OF OIL EXPLORATION AND PRODUCTION

1. BIOLOGICAL ASPECTS

R-184-78 (R-108-76)
ECOLOGICAL INVESTIGATIONS OF ALASKAN NORTH SLOPE OIL FIELD DEVELOPMENT - ARCTIC AND RED FOX STUDIES
Principal Investigator: Hanson, W.C., L. Eberhardt, and D. Ritter
Performing Organization: University of California, USDE Scientific Lab., PO Box 1663, Los Alamos, NM 87545
Supporting Organization: US Dept. of Energy, Washington, DC 20545
Period: 11/76 - 11/77
Funds: Unknown

Oil fields, Development, Environmental effects, Animals, Alaska, *Foxes, Baseline studies

The ecological effects of Alaskan arctic coastal plain oil field development will be studied at Prudhoe Bay, Colville River Delta, Franklin Bluffs, and Happy Valley. Current research includes: tagging and telemetry studies of arctic foxes; epidemiology of rabies in arctic foxes; interspecific relationships between arctic and red foxes; ecology of birds and small mammals; and a study of lichen sensitivity to air pollution.

[SSIE No. DA-109]

R-185-78
MAJOR COASTAL ECOSYSTEM CHARACTERIZATION AND METHODOLOGY WITH EMPHASIS ON FISH AND WILDLIFE AS RELATED TO OIL AND GAS DEVELOPMENT
Principal Investigator: Tait, H.
Performing Organization: US Dept. of the Interior, Fish & Wildlife Service, 10th & Constitution Ave. NW, Room 378, Washington, DC 20560
Supporting Organization: US Environmental Protection Agency, Office of Energy, Minerals & Industry, 401 M St. SW, Washington, DC 20460. Interagency No. D7-E685, V625A-81
Period: 1/77 - N/A
Funds: $600,000

Ecosystems, Coasts, Atlantic coast, *Pacific Northwest, Louisiana, Maine, Fish, Wildlife, Offshore development

The major objective is to develop a multi-year plan for ecological characterizations of coastal areas, and to prepare standardized methodologies and specifications for conducting the ecological characterizations. Currently, four selected coastal ecosystems (Southwestern Louisiana, Georgia/South Carolina, Maine, and Northwest Pacific Coast) are being characterized in order to evaluate factors with predictive potential.

[SSIE No. GMA-4772]

R-186-78 (R-017-77)

EFFECTS OF REFINERY WASTES AND OIL FROM TRANSFER FACILITIES ON PACIFIC NORTHWEST MARINE COASTAL ECOSYSTEMS

Principal Investigator:	Vanderhorst, J.R.
Performing Organization:	US Dept. of Energy, Battelle Pacific NW Lab., PO Box 999, Richland, WA 99352
Supporting Organization:	US Dept. of Energy, Div. of Biomedical & Environmental Research, 1717 H St. NW, Washington, DC 20545. No. 4116
Period:	10/76 - N/A
Funds:	Unknown

Mollusks, Ecosystems, Baseline studies, Refineries, Oil transfer, Oil terminals, Biological effects, Chronic effects, *Pacific Northwest

"Effects are being measured in terms of organic content of sediment, general community structure, and change in the age structure, recruitment, growth and mortality of an important clam species. The sites chosen for study include the Cherry Point region, an operating and developing refinery site; the Port Angeles region, an area for which a deep water port and pipeline terminus is proposed; and, the Sequim Bay region, an area to serve as an uncontaminated control. Anticipated effects would result from refinery wastes, chronic spillage of crude or refined oil, and the possible large spillage associated with tanker collision or grounding."

[SSIE No. ZPE-12362-1]

2. SOCIAL/ECONOMIC ASPECTS

R-187-78

POTENTIAL GEORGES BANK PETROLEUM DEVELOPMENT AND THE NEW ENGLAND FISHING INDUSTRY - AN ECONOMIC ANALYSIS

Principal Investigator:	Grigalunas, T., and J. Sutinen
Performing Organization:	University of Rhode Island, Agricultural Experiment Station, Administration Bldg., Wakefield, RI 02881
Supporting Organization:	Rhode Island State Government, Providence, RI 02930. No. 0069086, RI 00135
Period:	10/77 - 9/78
Funds:	Unknown

Georges Bank, Offshore development, Fisheries, Economic effects, Biological effects, EIS

This research examined the New England fishing industry, potential offshore petroleum activities, and the possible interactions between the two; recommendations are made based on the findings. The final report, *Petroleum and Fishing Interactions on Georges Bank: Volume II* was to be published in 1977 [no further information available]. The report covers biological effects of spills, offshore physical interference and debris problems, and onshore competition for labor and port-related services; it is being used as part of the EIS process.

[SSIE No. GY-69086-1]

3. BASELINE AND ENVIRONMENTAL IMPACT STUDIES

R-188-78
ENVIRONMENTAL ASSESSMENT OF THE NORTH ATLANTIC OUTER CONTINENTAL SHELF (GEORGES BANK)

Principal Investigator:	Aaron, J.M.
Performing Organization:	US Dept. of the Interior, Geological Survey, Woods Hole, MA 02543
Supporting Organization:	US Dept. of the Interior, Geological Survey, Geologic Division, 12201 Sunrise Valley Dr., Reston, VA 22092. No. 9450-01823
Period:	10/77 - 9/78
Funds:	$275,520

Offshore exploration, OCS, Environmental effects, Georges Bank, Baseline studies, *Risk analysis

The end product of this project will be the documentation of the major stresses and potential hazards that may be encountered in petroleum exploration and development on Georges Bank. Sediment mobility and sea floor stability will be assessed; the composition flux, and direction of suspended matter transiting the Bank will be estimated; and new current meter, meteorological, and other oceanographic data will be gathered. The result will be "a better three-dimensional picture of the hydrography of the Bank, which is critical in determining trajectories of oil spills and other pollutants."

[SSIE No. ZUA-4175-1]

R-189-78 (R-002-77)

SOUTHERN CALIFORNIA BORDERLAND - ENVIRONMENTAL

Principal Investigator: Greene, H.G.
Performing Organization: US Dept. of the Interior, Geological Survey, 345 Middlefield Rd., Menlo Park, CA 94025
Supporting Organization: US Dept. of the Interior, Geological Survey, Geologic Division, 12201 Sunrise Valley Dr., Reston, VA 22092. No. 9460-01650
Period: 10/77 - 9/78
Funds: $145,530

Baseline studies, *Geologic hazards, Natural seepage, OCS, California, Santa Barbara Channel, Sediments, Development

A study is being conducted to identify, map, and report the geologic hazards and problems that exist in the southern California Borderland, specifically in areas where future development may take place. Geologic hazards consist of faults, submarine landslides and slumps, hydrocarbon seeps, salt water intrusion sites, contaminant pathways, and areas of anomalous high erosion and sedimentation. Areas to be looked at include the central part of Santa Rosa-Cortes Ridge, San Diego shelf, western Santa Barbara Channel, and miscellaneous OCS areas that lie in water depths shallower than 750 m.

[SSIE No. ZUA-3979-2]

R-190-78 (R-302-75)

ENVIRONMENTAL ORGANIC GEOCHEMISTRY OF OUTER CONTINENTAL SHELVES

Principal Investigator: Miller, R.E.
Performing Organization: US Dept. of the Interior, Geological Survey, 12201 Sunrise Valley Dr., Herndon, VA 22092
Supporting Organization: Same as above. No. 9450-01543
Period: 10/77 - 9/78
Funds: $81,470

Baseline studies, OCS, Hydrocarbons, Sediments, Atlantic Coast, Gulf of Mexico, *Geochemistry

The principle objectives of this project are to determine quantitatively and distinguish qualitatively the low-level baseline concentrations of natural organic constituents such as hydrocarbons, asphaltics, fatty acids, sterols, and metallo-organic complexes in shelf and slope sediments; and to differentiate and classify those same substances that are related to specific geological and geochemical processes. The study area for this project encompasses the eastern seaboard Atlantic states and the Gulf of Mexico seaboard states.

[SSIE No. ZUA-3570-3]

E. FATE OF OIL IN THE ENVIRONMENT

1. BIODEGRADATION

R-191-78

THE MECHANISM AND KINETICS OF HYDROCARBON UTILIZATION BY MICROORGANISMS

Principal Investigator: Blanch, H.W.
Performing Organization: University of Delaware, School of Engineering, Newark, DE 19711
Supporting Organization: US National Science Foundation, Division of Engineering, 800 G St. NW, Washington, DC 20550. No. ENG75-16473 A01
Period: 5/78 - 12/78
Funds: $7,960

Biodegradation, Microorganisms, Hydrocarbons, *Intracellular kinetics

"The objectives of this proposed research are to provide a composite picture of the mechanism, regulation, and intracellular kinetics of hydrocarbon utilization. A model system, *Candida tropicalis* growing in n-hexadecane, will be used."

[SSIE No. GSE-5372-3]

R-192-78 (R-299-75)

DEGRADATIVE HYDROCARBON PLASMIDS

Principal Investigator: Chakrabarty, A.M.
Performing Organization: General Electric Company, 1 River Rd., Schenectady, NY 12305
Supporting Organization: US National Science Foundation, Div. of Physiology, Cellular & Molecular Biology, 1800 G St. NW, Washington, DC 20550. No. PCM77-25450
Period: 5/76 - 9/81
Funds: $32,000

Biodegradation, Hydrocarbons, Microorganisms, *Plasmid interaction, *Evolution

This research program continues studies initiated under Grant PCM75-10978 to further understand the mechanims of plasmid interaction, the evolution and formation of plasmid aggregates and cointegrates, and any selective amplification of such plasmids. The involvement of direct or inverted repeat sequences on such plasmids will be studied. "The transposition of hydrocarbon degradative genes from one plasmid to another is of immense significance in the evolution of degradation potential of chlorinated and non-chlorinated hydrocarbons among the aerobic soil microorganisms."

[SSIE No. GSB-16385-3]

2. GENERAL FATE OF OIL

R-193-78
TRANSPORT OF ENERGY-RELATED CONTAMINANTS IN THE NEARSHORE COASTAL WATERS OF THE SOUTH ATLANTIC BIGHT

Principal Investigator: Blanton, J.O.
Performing Organization: Skidaway Institute of Oceanography, PO Box 13687, Savannah, GA 31406
Supporting Organization: US Dept.of Energy, 17th & Pennsylvania Ave. NW, Washington, DC 20006. Contract EY-77-S-09-1025
Period: 8/77 - 8/78
Funds: $47,000

Contaminants, Fate, Dispersion, Atlantic Coast, *Currents

"This research is concerned with determining conditions under which energy-related contaminants present in the coastal waters are trapped by coastal currents and prevented from diffusing offshore. Specific objectives are [to]: 1) describe the coastal current regimes within 20 km from the coast; 2) determine the role of nearshore fronts, Gulf Stream and shelf-water interactions and freshwater input in transporting and dispersing energy-related contaminants."

[SSIE No. DJ-1097-1]

R-194-78 (R-094-77)
PETROLEUM HYDROCARBONS IN THE SEDIMENTS OF THE BERMUDA PLATFORM

Principal Investigator: Butler, J.N.
Performing Organization: Harvard University, School of Arts & Sciences, Cambridge, MA 02138
Supporting Organization: US National Science Foundation, Div. of Ocean Sciences, 1800 G St. NW, Washington, DC 20550. No. OCE77-18662
Period: 11/77 - 4/79
Funds: $42,500

Sedimentation, Hydrocarbons, Fate, Chromatography, Spectrometry, Bermuda

"This research project will sample sediments on the slope of the Bermuda platform at depths from shallow lagoonal to abyssal, and characterize the hydrocarbons found in these sediments using column chromatography, gas chromatography, and mass spectrometry." It is speculated that one possible fate of petroleum residues in the open ocean is accumulation in the sediments. On the basis of chemical composition, the relative contribution of petroleum residues will be inferred, as distinct from biogenic hydrocarbons for example. Transitions in hydrocarbon composition with increasing depth will be analyzed.

[SSIE No. CY-337]

R-195-78 (R-124-76)
LIGHT HYDROCARBONS - OCS
Principal Investigator: Cline, J.
Performing Organization: US Dept. of Commerce, Environmental Research Labs, Boulder, CO 80302
Supporting Organization: US Dept. of Commerce, NOAA, Environmental Research Labs, Boulder, CO 80302. No. R7120841
Period: 10/77 - 9/78
Funds: $104,780

Hydrocarbons, Sources, Fate, Sedimentation, Alaska, OCS, *Norton Sound

This research project will evaluate the sources and fates of low molecular wt hydrocarbons in Norton Sound, Alaska and will assess the transport capacity of suspended sediments for heavy hydrocarbons.

[SSIE No. ZBP-1405]

R-196-78 (R-140-78)
DISTRIBUTION AND FATE OF BIOGENIC AND PETROLEUM-DERIVED SUBSTANCES IN MARINE SEDIMENTS
Principal Investigator: Kaplan, I.R.
Performing Organization: University of California, Inst. of Geophysics & Planetary Physics, 405 Hilgard Ave., Los Angeles, CA 90024
Supporting Organization: US Dept. of Energy, Div. of Biomedical & Environmental Research, 1717 H St., NW, Washington, DC 20545. No. 6334
Period: 10/76 - N/A
Funds: Unknown

Fate, Distribution, Biogenic hydrocarbons, Petrochemicals, Sedimentation, Oceans, GC/MS

Project studies include: evaluation of marine and terrestrial contributions of carbon compounds to ocean sediments; fluxes of carbon, nitrogen, phosphorus, and sulfur at the sediment-water interface; differentiation of marine biogenic and petrochemical hydrocarbons; and fate of hydrocarbons in the sediment column. Results thus far show that the use of N-15/N-14 and S-34/S-32 stable isotope ratios in crude oils and petroleums is an effective method for differentiation of their origin and source; GC and GC/MS are used for compound recognition of petroleum products in marine sediments.

[SSIE No. GPE-6130-1]

R-197-78 (R-126-76)
PHYTOPLANKTON - OCS

Principal Investigator: Larrance, J.D.
Performing Organization: US Dept. of Commerce, Environmental Research Labs, Boulder, CO 80302
Supporting Organization: US Dept. of the Interior, BLM, 19th & C Sts. NW, Washington, DC 20240. No. R7120844
Period: 10/77 - 9/78
Funds: $127,800

Sedimentation, Benthos, Source identification, *Organic detritus, *Petroleum pollutants, Baseline studies, Alaska, OCS

The project objective is to examine the role of organic detritus in the Lower Cook Inlet ecosystem and its potential for transporting petroleum pollutants to the benthos. Immediate plans are to conduct a field investigation to assess the flux of organic detritus to the benthos, and identify the composition and origin of this detritus. A baseline study of phytoplankton and primary production in Lower Cook Inlet has been completed.

[SSIE No. GUK-70-3]

3. MODELS AND PREDICTIONS

R-198-78
STATISTICAL MECHANICS OF INHOMOGENEOUS FLUIDS

Principal Investigator: Davis, H.T.
Performing Organization: University of Minnesota, School of Engineering, 105 Morrill Hall, Minneapolis, MN 55414
Supporting Organization: US National Science Foundation, Division of Engineering, 1800 G St. NW, Washington, DC 20550. No. ENG76-22190 A01
Period: 12/76 - 7/79
Funds: $34,950

Models, Statistical analysis, Emulsions, Behavior, *Oil-surfactant-water systems

The project objective is "to elucidate the non-equilibrium behavior of microemulsion systems through theoretical investigations of molecular and statistical models of these systems. Specific problems to be studied include: 1) Mean field theory of the rates of formation of microstructures in oil-surfactant-water systems and of the stability of these microstructures; 2) Theory of diffusivity, electrical conductivity and viscosity of mono-continuous and bicontinuous microemulsions; 3) Theory of interfacial tensions of long-lived, non-equilibrium states of microemulsion systems. 4) Theory of interfacial excess transport properties."

[SSIE No. GSE-4923-3]

R-199-78
ALASKA NUMERICAL MODELING

Principal Investigator: Galt, J.
Performing Organization: US Dept. of Commerce, Environmental Research Labs, Boulder, CO 80302
Supporting Organization: US Dept. of Commerce, NOAA, Environmental Research Labs, Boulder, CO 80302. No. R7120845
Period: 10/77 - 9/78
Funds: $150,000

Models, *Spill trajectory, Distribution, OCS, Alaska

Numerical models and simulations of the marine environment are being developed in order to: "1) explain dynamic processes controlling the possible distribution of substances in the ocean; 2) aid in the interpretation of observational data; and 3) develop computer graphics to facilitate the presentation of research results." These studies support the Alaskan Outer Continental Environmental Assessment Program. Progress includes the design of a general oil spill trajectory model and the development and testing of a diagnostic model for oceanic surface velocities in coastal regions.

[SSIE No. ZBP-1400]

R-200-78
ARCTIC OIL SPILL MOVEMENT

Principal Investigator: Lissauer, I.M., G.L. Hufford, and J.P. Welsh
Performing Organization: US Dept. of Transportation, Coast Guard R & D Center, Avery Point, Groton, CT 06340
Supporting Organization: US Dept. of Transportation, Coast Guard, 400 7th St. SW, Washington, DC 20590
Period: 10/77 - 10/78
Funds: Unknown

Oil spills, Drift, Movement, Ice, Models, Beaufort Sea

The area of study is the Beaufort Sea; the purpose of the project is to determine oil spill drift in ice-infested waters. Results of the study will be included in a predictive model.

[SSIE No. ZZF-126-1]

F. OIL POLLUTION REGULATIONS

[No entries.]

G. BILBLIOGRAPHIES

[No entries.]

H. MISCELLANEOUS

[No entries.]

* Additional information not available at time of publication
** Possibly oil pollution related topic or paper
FFI For further information

OCT 24-DEC 1 *United Nations Educational, Scientific and Cultural Organization 20th Session of the General Conference, Paris, 1978
Sponsored by the United Nations Educational, Scientific and Cultural Organization (UNESCO)

FFI contact UNESCO, Place de Fontenoy, 75700 Paris, France.

OCT 24-27 Society of Petroleum Engineers European Offshore Petroleum Conference and Exhibition, London, 1978
Sponsored by the Society of Petroleum Engineers (SPE) and the Institute of Petroleum (IP)

Oil Pollution Related Papers

Session: Legislation/Environment

Paper No. 06
THE ROLE OF THE DEPARTMENT OF ENERGY IN THE SAFE DEVELOPMENT OF UK OFFSHORE OIL AND GAS RESOURCES
George, H.R.

Paper No. 08
ENVIRONMENTAL PROTECTION IN THE CONTEXT OF NORTH SEA OIL DEVELOPMENTS
Appelbee, J.F., and C.S. Johnston

Session: Offshore Loading Systems

Paper No. 67
**OFFSHORE TANKER TERMINAL BERTHING PROBLEMS
Macgregor, P.S., M. Capages, Jr., and J.F. O'Sullivan

FFI contact SPE European Offshore Petroleum Conference and Exhibition, 6200 North Central Expressway, Dallas, TX 75206; or Ms. Lynda Boothby, Institute of Petroleum, 61 Cavendish Street, London WIM 8AR, UK.

OCT 25-27 *Third International Symposium on Polynuclear Aromatic Hydrocarbons, Columbus, Ohio, 1978
Sponsored by Battelle's Columbus Laboratories

FFI contact Dr. Philip Leber, Cochairman, Battelle's Columbus Laboratories, 505 King Avenue, Columbus, OH 43201.

OCT 31-NOV 1 *National Symposium on Energy and the Oceans, Key Biscayne, Florida, 1978
Sponsored by the Institute on Man and the Oceans, the Bureau of National Affairs' Energy Users Report, and the Environment Reporter

FFI contact National Symposium Secretary, Room 413, 1231 25th Street, NW, Washington, DC 20037.

NOV 1-2 Spill Control Technology Seminar, Long Beach, California, 1978
Sponsored by the Spill Control Association of America

Oil Pollution Related Papers

ENFORCEMENT OF CALIFORNIA'S SPILL POLLUTION LAWS
Dubiel, E.

ROLE OF COAST GUARD AND THE COAST GUARD'S 'FIRST AID' RESPONSE
Fouts, J.G.D.

EPA'S ENFORCEMENT RESPONSIBILITIES
Jaffe, J.

THE CALIFORNIA STATE SPILL CONTINGENCY RESPONSE PLAN
Condit, R.

FISH AND GAME'S ROLE IN CALIFORNIA'S SPILL CONTINGENCY PLAN
Simons, E.

CRITERIA TO USE IN SELECTING A SPILL CLEANUP/CONTROL COURSE
Acuff, J.

A NEW PAIR OF EYES
Katz, W.B.

HAZARDOUS MATERIAL RESPONSE EMERGENCY CASE STUDY
Abernathy, P.

NATIONAL FIRE PROTECTION ASSOCIATION'S HAZARDOUS MATERIAL MARKING SYSTEM
Connor, M.E.

THE ROLE OF THE SPILL CLEANUP CONTRACTOR
Dalton, T.F.

GROUND WATER CLEANUP
Raymond, R.L.

DEVELOPMENT OF HARDWARE SYSTEMS TO TRANSPORT AND DISPOSE OF OIL AND DEBRIS FROM MARINE SPILLS
Ross, D.E.

GASOLINE SEWER SPILL - MILAN, MICHIGAN
Connor, M.E.

LANDSPREADING OF OILY WASTES
Raymond, R.L.

HAZARDOUS MATERIALS WASTE TREATMENT AND REGULATORY IMPACT
Bauer, D.

DESIGN CRITERIA ANALYSIS OF MECHANICAL OIL RECOVERY SYSTEMS
Lerch, D.W.

CONTRACT CO-OP RELATIONSHIPS
Paulsen, B., and M. Craig

ALASKA CO-OP SPILL RESPONSE PLAN (ACOSRP)
Allen, A.

DISPERSANTS - JUST HOW PRACTICAL?
no author noted

FFI contact Marc K. Shaye, SCAA, 17117 West Nine Mile Road,
Suite 1515, Southfield, MI 48075.

NOV* *Third Session of the Sub-Group of Experts on the IGOSS Marine Pollution (Petroleum) Monitoring Pilot Project, Paris, 1978
Sponsored by the Intergovernmental Oceanographic Commission

FFI contact Intergovernmental Oceanographic Commission, Place de
Fontenoy, 75700 Paris, France.

NOV 2-3 *Offshore Oil Conference, Dallas, Texas, 1978
Sponsored by the Energy Bureau Inc.

FFI contact Jared Smith, Energy Bureau Inc., 101 Park Avenue,
New York, NY 10017.

NOV 8-10 American Chemical Society 30th Southeastern Regional Meeting, Savannah, Georgia, 1978
Sponsored by the American Chemical Society (ACS)

Oil Pollution Related Papers

Session: Analytical

Paper No. 3
COMPUTERIZED DATA ANALYSIS FOR FINGERPRINTING OF OIL SPILLS BY HIGH-RESOLUTION GC WITH SELECTIVE DETECTORS
Mayfield, H., and W. Bertsch

Session: Symposium on Marine Chemistry

Paper No. 195
FATE OF PETROLEUM IN ESTUARINE WATERS AND SEDIMENTS OF THE SOUTHEASTERN US
Lee, R.F.

FFI contact Dr. John G. Brewer, Department of Chemistry and Physics, Armstrong State College, Savannah, GA 31406.

NOV 8-10 *Conference on Oil Tanker Transportation: An Interdisciplinary Analysis of National and International Policy and Practice, Georgetown, South Carolina, 1978
Sponsored by the Belle W. Garuch Institute for Marine Biology and Coastal Research, and the US Department of Transportation

FFI contact Ernest B. Altekruse, C-DPPCM, Moncrief Army Hospital, Fort Jackson, SC 29207.

NOV 13 *Effluent and Water Treatment and the Environmental Pollution Control Exhibition, Birmingham, United Kingdom, 1978

FFI contact Howard Philips, Brintex Exhibitions, Ltd., 178-202, Great Portland Street, London, W1N 6NH, UK.

NOV 13-17 *First Session of the Assembly of the International Oil Pollution Compensation Fund, London, 1978
Sponsored by the International Maritime Consultative Organization (IMCO)

FFI contact C.P. Srivastava, Secretary-General, IMCO, 101-104 Piccadilly, London, W1V OAE, UK.

NOV 17-18 *Pretreatment and Land Application for Industrial Wastes, Miami Beach, Florida, 1978
Sponsored by the American Institute of Chemical Engineers (AIChE)

FFI contact AIChE Continuing Education Department, 345 East 47th, New York, NY 10017.

NOV 21-22 The Effective Use of Petroleum, London, 1978
Sponsored by the Institute of Petroleum (IP)

Oil Pollution Related Papers

Session: Oil in Transport

**MARINE TRANSPORT
Anketell-Jones, M.W.

FFI contact Ms.Lynda Boothby, Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR, UK.

NOV 24-
DEC 2 *International Commission for the Scientific Exploration of the Mediterranean XXVI Congress and Plenary Assembly, Antalya, Turkey, 1978
Sponsored by the International Commission for Scientific Exploration of the Mediterranean (ICSEM)

FFI contact Secretary-General, ICSEM, 16bd de Suisse, Monte Carlo, Monaco.

NOV 27-29 *National Conference on Quality Assurance of Environmental Measurements, Denver, Colorado, 1978
Sponsored by the Hazardous Materials Control Research Institute and Information Transfer, Inc.

FFI contact Bobbie D. Zucker, Conference Coordinator, Information Transfer, Inc., 1160 Rockville Pike, Suite 202, Rockville, MD 20852.

NOV 28-
DEC 2 *Meeting on Remote Sensing, Bangkok, Thailand, 1978
Sponsored by the Economic and Social Commission for Asia

FFI contact Economic and Social Commission for Asia, Sala Santitham, Rajad Amnern Avenue, Bangkok, Thailand.

NOV 29-30 *Recycled Oil Workshop, Gaithersburgh, Maryland, 1978
Sponsored by the National Bureau of Standards and the Energy Research and Development Administration

FFI contact D.E. Becker, B50 Physics Building, National Bureau of Standards, Washington, DC 20234.

DEC 4-8 *International Maritime Consultative Organization Marine Environmental Protection Committee, London, 1978
Sponsored by the International Maritime Consultative Organization (IMCO)

FFI contact Y. Sasamura, Director, IMCO Marine Environment Division, 101-104 Piccadilly, London W1V OAE, UK

DEC 11-15 *Legal Aspects of Pollution Resulting from Exploration and Exploitation of the Continental Shelf and the Sea Bed and its Subsoil in the Mediterranean, Rome, 1978

FFI contact Environmental Law Unit, United Nations Environment Programme, PO Box 30552, Nairobi, Kenya.

DEC 12-14 *Southeastern Oil Spill Response Workshop, Kiawah Island, South Carolina, 1978
Sponsored by the National Oceanic and Atmospheric Administration (NOAA) and the Environmental Protection Agency (EPA)

FFI contact William P. Davis, EPA Bear Bluff Field Station, PO Box 368, Johns Island, SC 29455.

DEC 12-16 *Symposium on Development for Multi-Media Monitoring Environmental Pollution, Riga, USSR, 1978
Sponsored by the World Meteorological Organization

FFI contact World Meteorological Organization, Avenue G. Motta, 1211 Geneva, Switzerland.

JAN 5 The Amoco Cadiz Oil Spill Symposium, Houston, Texas, 1979
Sponsored by the American Association for the Advancement of Science (AAAS)

The symposium is part of the Annual Meeting of the American Association for the Advancement of Science.

FFI contact Elizabeth Zeutschel, Meetings Manager, AAAS, 1776 Massachusetts Avenue, NW, Washington, DC 20036.

JAN 29 *American Society for Testing and Materials Committee D-19 Symposium on Water for Subsurface Injection. Ecological Assessments of Effluent Impacts on Communities of Indigenous Aquatic Organisms, Ft. Lauderdale, Florida, 1979
Sponsored by the American Society for Testing and Materials (ASTM)

FFI contact ASTM, 1916 Race Street, Philadelphia, PA 19103.

FEB 18-22 *American Institute of Mining, Metallurgical and Petroleum Engineers 108th Annual Meeting, New Orleans, Louisiana, 1979
Sponsored by the American Institute of Mining, Metallurgical and Petroleum Engineers (AIME)

FFI contact Alexander R. Scott, AIME, 345 East 47th Street, New York, NY 10017.

FEB 19-23 *American Society for Testing and Materials, Committee F-20 Meeting on Spill Control Systems, Tampa, Florida, 1979
Sponsored by the American Society for Testing and Materials (ASTM)

FFI contact Mr. Sam Bowman, Staff Manager, ASTM, 1916 Race Street, Philadelphia, PA 19103.

FEB 26-28 *Sixth Energy Technology Conference and Exposition '79, Washington, DC, 1979

FFI contact Martin Heavner, Government Institutes, 4733 Bethesda Avenue, NW, Washington, DC 20014.

MAR 3-7 *Oceanology International '80 and Oceanology International World Conference, Brighton, England, 1980

FFI contact BPS Exhibition Ltd., 4 Seaford Court, 220-222 Great Portland Street, London, W1N 5HH, UK.

MAR 19-22 1979 Oil Spill Conference (Prevention, Behavior, Control, Cleanup), Los Angeles, California, 1979
Sponsored by the American Petroleum Institute (API), the Environmental Protection Agency (EPA), and the US Coast Guard (USCG)

The following are preliminary session topics:

Training and Prevention;
Contingency Planning;
Oil Spill Cooperatives;
Tanker Pollution Control - Issues and Progress;
Sensing and Monitoring;
Birds and Scientific Response Teams;
Spill Effects on Nekton and Plankton;
Legal and Financial Aspects;
Legal-Socio-Economic Aspects;
Cold Weather Techniques;
Oil Spills in Icy Rivers;
Cleanup Techniques for Restricted Waters;
Petroleum in Benthic Organisms;
Petroleum in Bottom Sediments;
Levels of Petroleum Hydrocarbons in the North Sea;
Oil Spill Modeling Techniques;
Contingency Planning in Varied Geographic Regions;
Marine Developments;
Dispersants;
New Equipment and Techniques;
Field Observations; and
Case History: Amoco Cadiz.

FFI contact Dr. Charles C. Bates, Program Chairman, c/o US Coast Guard (G-DS/62), Washington, DC 20590.

MAR 26-29 *International Congress on Materials Aspects of World Energy Needs, Washington, DC, 1979
Sponsored by the National Academy of Sciences, and the National Academy of Engineering

FFI contact Dr. Richard S. Claassen, Sandia Laboratories, Albuquerque, NM 87115.

MAR 27-29 *Measurement and Control of Offshore Platforms and Land Terminals Symposium and Exhibition, Brighton, UK, 1979
Sponsored by the Institute of Measurement and Control (InstMC)

Topics will include blowout protection instrumentation, and fire and explosion protection systems.

FFI contact E. Eden, Secretary, InstMC, 20 Peel Street, London, W8N 7PD, UK.

APR 1-5 American Institute of Chemical Engineers 86th National Meeting and 10th Petrochemical and Refining Exposition, Houston, Texas, 1979
Sponsored by the American Institute of Chemical Engineers (AIChE)

The Environmental Section will include papers possibly related to oil pollution in the following sessions: Solid waste, Water, and General Wastewater Treatment.

FFI contact Robert F. Anderson, Director, Experimental Development Department, UOP Process Division, PO Box Drawer C, Riverside, IL 60546.

APR 30-
MAY 1-2 *Institute of Environmental Sciences Annual Technical Meeting and Exposition, Seattle, Washington, 1979
Sponsored by the Institute of Environmental Sciences (IES)

Theme of the meeting is "Learning to Use our Environment."

FFI contact Institute of Environmental Sciences, 940 East Northwest Highway, Mt. Prospect, IL 60058.

APR 30
MAY 1-3 *11th Annual Offshore Technology Conference, Houston, Texas, 1979
Sponsored by the American Institute of Chemical Engineers

(AIChE), and the Institute of Electrical and Electronics Engineers (IEEE)

FFI contact Offshore Technology Conference, 6200 North Central Expressway, Dallas, TX 75206.

MAY 21-24 *Sixth National Conference on Energy and the Environment, Pittsburg, Pennsylvania, 1979
Sponsored by the American Institute of Chemical Engineers (AIChE)

FFI contact Dr. Duane G. Nichols, Research Triangle Institute, PO Box 12194, Research Triangle Park, NC 27709.

READER'S GUIDE TO THE KEYWORD INDEX

The Master List of Keywords and Cross-Reference Guide is comprised of approximately 400 scientific, technical, geographic, and other descriptive terms relevant to the field of oil pollution. This list serves as a topical guide to the literature abstracts and research project summaries contained in Section I (C- -78) and in Section II (R- -78) of the REPORTS. Only terms included in the list are alphabetically permuted by computer to form the Keyword Index; additional free-language terms assigned to more thoroughly define the subject coverage of a specific entry are designated by an asterisk (*) in the Keyword Index, but do not appear as separate alphabetical entries. The Master List of Keywords and Cross-Reference Guide is continually updated to reflect trends in the current literature and research pertaining to oil pollution.

To effectively use the Keyword Index, the reader should use the following procedure: 1) scan the Master List of Keywords and Cross-Reference Guide to determine all possible terms and word variants applicable to the topic of interest; 2) look up all terms in the Keyword Index and scan other words in each entry to determine the relevancy of the entry; and 3) note the citation numbers of relevant entries and refer to them in the body of the REPORTS.

MASTER LIST OF KEYWORDS AND CROSS-REFERENCE GUIDE

S: See
SA: See also

Absorption
Activated sludge ... SA: Sludge
Acute effects
Adsorption
Africa
Alabama
Alaska
Algae ... SA: Phytoplankton
Amoco Cadiz spill
Amphipods
Analytical techniques ... SA: Chemical analysis, Chromatography, Source identification
Animals ... SA: Invertebrates, Marine mammals, Marine organisms, Vertebrates
Annelids ... SA: Polychaetes
Antarctica
API
Arctic ... SA: Subarctic regions
Arctic Ocean
Argentina
Argo Merchant spill
Aromatic hydrocarbons ... SA: Hydrocarbons, PAH
Asia
Atlantic coast ... SA: Coasts
Atlantic Ocean
Australia
Bacteria ... SA: Microorganisms
Bahamas
Ballast
Baltic Sea
Barent Sea
Baseline studies ... SA: EIS
Bays ... SA: Estuaries, Harbors
Beach cleanup
Beaches ... SA: Coasts, Shorelines
Beaufort Sea
Behavior ... SA: Fate
Belgium
Benthos ... SA: Invertebrates, Marine organisms
Bering Sea
Bermuda
Bibliographies
Bilges
Bioassay
Biodegradation ... SA: Bacteria, Microorganisms
Biogenic hydrocarbons ... SA: Hydrocarbons
Bioindicators
Biological effects ... SA: Acute effects, Chronic effects, Toxicity
Biological treatment
Biomass
Birds
Black Sea
BLM
Blowout prevention
Blowouts
Book review
Booms ... SA: Spill containment
Bouchard 65 spill ... SA: Buzzards Bay
Brazil
Buzzards Bay ... SA: Massachusetts
California
Canada
Carcinogens ... SA: Health hazards, PAH
Caribbean Sea
Caspian Sea
Chedabucto Bay
Chemical analysis ... SA: Analytical techniques, Chromatography, Source identification, GC/MS
Chemical effects
Chesapeake Bay
Chile
China
Chromatography ... SA: Analytical techniques, Chemical analysis, GC/MS
Chronic effects ... SA: Biological effects
Coalescence ... SA: Flocculation
Coastal zone management
Coasts
Compensation
Connecticut

Conservation
Containment ... S: Booms, Spill containment
Contaminants
Contamination
Contingency planning
Corals
Coral reefs
Cost analysis ... SA: Economics
Crankcase oil ... SA: Lubricating oil
Crude oil
Crude oil washing
Crustaceans
Decomposition
Deepwater ports ... SA: Harbors, Oil terminals, Ports
Delaware
Delaware Bay
Denmark
Design-engineering
Detection ... SA: Monitoring, Chemical analysis
Development ... SA: Offshore development
Dispersants ... SA: Emulsifiers, Surfactants
Dispersion ... SA: Drift, Movement, Spreading
Dispersions ... S: Emulsions
Disposal ... SA: Waste oil disposal, Wastewater disposal
Distillation
Distribution
DOE
Drift ... SA: Movement, Spreading
Drilling ... SA: Offshore drilling, Oil wells, Platforms
Echinoderms
Economic effects
Economics ... SA: Cost analysis
Ecosystems
Ecuador
Effluent treatment ... S: Wastewater treatment
EIS ... SA: Baseline studies
Ekofisk blowout
Emulsification
Emulsifiers ... SA: Dispersants, Surfactants
Emulsions
Engineering ... S: Design-engineering
England ... SA: UK
English Channel
Environmental deterioration
Environmental effects ... SA: EIS
Environmental Impact Statement ... S: EIS
Environmental management ... SA: Coastal zone management, Resource management
Environmental protection
EPA
Equipment ... SA: Product information
ERDA
Estuaries ... SA: Bays
Europe
Evaporation
Exploration ... SA: Offshore exploration, Production
Extraction
Fate ... SA: Behavior
FEA
Filtration ... SA: Flocculation, Ultrafiltration
Finland
Fish
Fisheries
Flocculation ... SA: Coalescence, Filtration
Florida
Florida spill
Flotation
Food chain ... S: Food web
Food web
Foreign governments ... SA: Government agencies
Fossil fuels
France
Freshwater
Fuel oil
Fuels
Fungi ... SA: Microorganisms
Gas-liquid chromatography ... S: Chromatography
Gasoline
GC/MS ... SA: Chemical analysis, Chromatography, Spectrometry
Georges Bank
Georgia
Germany, East
Germany, West

Government agencies ... SA: BLM, DOE, EPA, ERDA, FEA, NOAA, USCG, USGS, USN; Foreign governments, State governments, US Government
Gravity separation ... SA: Oil-water separation
Great Lakes
Greenland
Groundwater
Growth
Guidelines ... SA: Manuals
Gulf of Alaska
Gulf of Mexico
Habitats
Harbors ... SA: Bays, Deepwater ports, Oil terminals, Ports
Health hazards ... SA: Carcinogens
Hydrocarbons ... SA: Aromatic hydrocarbons, Biogenic hydrocarbons, Crude oil, PAH, WSF
Ice
Illinois
IMCO
Incineration
India
Indian Ocean
Indonesia
Industries ... SA: Oil industry
Information systems
Infrared spectroscopy ... S: Spectroscopy
Inland ... SA: Onshore impacts
Insurance
International agreements ... SA: Foreign governments
International conventions ... SA: Foreign governments, Legislation, Regulations
Intertidal zone
Invertebrates ... SA: Marine organisms
Iran
Iraq
Ireland
Israel
Italy
Japan
Kuwait
Labrador Sea
Lakes ... SA: Great Lakes
Law enforcement
Leakage
Legislation ... SA: International conventions, Regulations
Liability
Louisiana
Lubricating oil
Maine
Manuals ... SA: Guidelines
Marine mammals ... SA: Animals, Vertebrates
Marine organisms
Marshes
Maryland
Massachusetts ... SA: Buzzards Bay
Mass spectroscopy ... S: Spectroscopy, GC/MS
Mediterranean Sea
Metabolism ... SA: Growth, Release, Uptake
Metula spil ... SA: Strait of Magellan
Mexico
Michigan
Microorganisms ... SA: Algae, Bacteria, Biodegradation, Fungi, Yeasts
Middle East
Mississippi
Mississippi River
Models
Mollusks ... SA: Invertebrates
Monitoring ... SA: Detection, Remote sensing, Sampling
Mortality
Movement ... SA: Spreading, Drift
Narragansett Bay
Natural seepage
Neuston
New Hampshire
New Jersey
New Mexico
New York
Niches
NOAA
North Carolina
North Sea
Norway
Oceans ... SA: Sea surface, Seawater
OCS ... SA: Oil-gas leasing
Offsore development
Offshore drilling
Offshore exploration
Offshore production
Oil ... S: Crankcase oil, Crude oil,

Fuel oil, Lubricating oil, Petroleum products, Waste oil
Oil discharges
Oil fields ... SA: Production
Oil-gas leasing ... SA: OCS
Oil industry
Oil shale
Oil slicks
Oil spills
Oil tanks
Oil terminals ... SA: Deepwater ports, Harbors, Ports
Oil transfer
Oil transport ... SA: Tankers
Oil-water separation ... SA: Gravity separation, Wastewater treatment
Oil wells ... SA: Drilling, Production, Offshore drilling, Offshore production
Olympic Games spill
Onshore impacts ... SA: Inland
Oregon
Oxidation ... SA: Biodegradation, Weathering
Pacific Ocean
PAH ... SA: Hydrocarbons
Patent
Pennsylvania
Personnel training
Petrochemicals
Petroleum ... S: Crude oil
Petroleum industry ... S: Oil industry
Petroleum products
pH control
Philippines
Physical effects
Phytoplankton
Pipelines
Plankton ... SA: Phytoplankton, Zooplankton
Plants ... SA: Vegetation
Platforms ... SA: Offshore drilling
Pollution control
Pollution prevention ... SA: Environmental protection, Contingency planning
Polychaetes ... SA: Annelids
Ports ... SA: Deepwater ports, Harbors, Oil terminals
Portugal
Precipitation
Product information ... SA: Equipment
Production ... SA: Offshore production, Drilling, Offshore drilling
Prudhoe Bay
Puerto Rico
Puget Sound
Reclamation ... SA: Recycling, Reuse
Recovery ... SA: Restoration
Recycling ... SA: Reclamation, Reuse
Red Sea
Refineries
Refining
Regulations ... SA: Legislation, International conventions
Release ... SA: Growth, Metabolism, Uptake
Remote sensing ... SA: Detection, Monitoring
Reproduction
Residual oils
Resource management ... SA: Coastal zone management, Environmental management
Restoration ... SA: Recovery
Reuse ... SA: Reclamation, Recycling
Rhine River
Rhode Island
Rivers ... SA: Streams
Safety ... SA: Health hazards
Sampling ... SA: Detection, Monitoring, Source identification
San Francisco Bay
Santa Barbara Channel
Sargasso Sea
Saudi Arabia
Scotland
Sea surface ... SA: Oceans
Seawater
Sedimentation
Sediments
Segregated ballast
Ships ... SA: Tankers
Shorelines ... SA: Beaches, Coasts
Sinking agents
Skimmers ... SA: Spill cleanup
Sludge ... SA: Activated sludge
Social effects
Socioeconomic effects
Soil

Solid wastes ... SA: Sludge
Solubility
Solution
Solvents
Sorbents ... SA: Absorption, Adsorption
Source identification
Sources
South Carolina
Spain
Spectrometry
Spectroscopy
Spill cleanup
Spill containment
Spill disposal
Spill removal
Spreading ... SA: Drift, Movement
St. Lawrence River
State governments ... SA: US Government, Government agencies
Statistical analysis
Statistics
Storage
Strait of Gibraltar
Strait of Magellan
Streams ... SA: Rivers
Subarctic regions ... SA: Arctic
Sublethal effects
Superports ... S: Deepwater ports, Oil terminals, Ports
Supertankers ... S: Tankers
Surfactants ... SA: Dispersants, Emulsifiers
Surveillance
Sweden
Syria
Tankers, SA: Ships
Tar
Tar sands
Texas
Torrey Canyon spill
Toxicity ... SA: Biological effects
Tropical regions
Turkey
UK ... SA: England
Ultrafiltration ... SA: Filtration
UN
Uptake ... SA: Growth, Metabolism, Release
Urquiola spill
US
USCG
US Government ... SA: State governments, Government agencies
USGS
USN
USSR
Vegetation ... SA: Plants
Venezuela
Vertebrates ... SA: Animals, Marine mammals
Vietnam
Virgin Islands
Virginia
Washington
Waste oil
Waste oil treatment
Wastewaters
Wastewater treatment ... SA: Oil-water separation
Waterfowl ... S: Birds
Water quality
Water soluble fraction ... S: WSF
Weathering
West Indies
Wildlife
WSF
Yeasts ... SA: Microorganisms
Yugoslavia
Zooplankton ... SA: Plankton

1276 ABSORPTION, SPILL CLEANUP, PATENT, *MAGNETIC SORBENT POWDER, POLLUTION CONTROL
1284 " WASTEWATER TREATMENT, SORBENTS, PATENT
1320 " OIL-WATER SEPARATION, SORBENTS, PATENT, *PLANT FIBER MATS
1322 " OIL-WATER SEPARATION, SORBENTS, PATENT, *PLANT FIBER MATS
1325 " OIL-WATER SEPARATION, SORBENTS, PATENT, *URETHANE FOAM
1326 " OIL-WATER SEPARATION, SORBENTS, PATENT, *SORBENT MATS
R159 " HYDROCARBONS , SPILL CLEANUP, *STARCH POLYMERS
1356 ACUTE EFFECTS, BIRDS, MORTALITY, SUBLETHAL EFFECTS, CONTAMINATION, HABITATS, *WATERFOWL
1357 " CRUDE OIL, DISPERSANTS, FISH, *SALMO GAIRDNERI, *SERUM GLUCOSE AND SODIUM, *GILL MORPHOLOGY
1415 " BIODEGRADATION, MICROORGANISMS, OCS, OIL SPILLS, CHRONIC EFFECTS, SAMPLING
R172 " TOXICITY, BIOASSAY, REFINERIES, WASTEWATERS, FISH
1297 ADSORPTION, WASTEWATER TREATMENT, OIL-WATER SEPARATION, SORBENTS, PATENT, *SORBENT FIBERS
1298 " WASTEWATER TREATMENT, OIL-WATER SEPARATION, SORBENTS, PATENT, *SORBENT FIBERS
1299 " WASTEWATER TREATMENT, SORBENTS, PATENT
1300 " WASTEWATER TREATMENT, PATENT, SORBENTS
1303 " WASTEWATER TREATMENT, OIL-WATER SEPARATION, SORBENTS, PATENT, *SORBENT FIBERS
1311 " OIL-WATER SEPARATION, SORBENTS, PATENT, *KAPOK FIBERS
1315 " OIL-WATER SEPARATION, HYDROCARBONS , SEAWATER, SEDIMENTATION
1318 " OIL-WATER SEPARATION, EMULSIONS, PATENT, *SORBENT POWDER
1336 ALASKA , CONTINGENCY PLANNING, US, REGULATIONS, POLLUTION PREVENTION, POLLUTION CONTROL, OIL WELLS, INLAND
1391 " EIS, OIL-GAS LEASING, OCS, OFFSHORE DEVELOPMENT, BLM, *LOWER COOK INLET
1392 " EIS, OIL-GAS LEASING, OCS, OFFSHORE DEVELOPMENT, BLM, *LOWER COOK INLET
1393 " EIS, OIL-GAS LEASING, OCS, OFFSHORE DEVELOPMENT, BLM, *LOWER COOK INLET
1404 " BASELINE STUDIES, SHORELINES, SEDIMENTATION, OIL SPILLS, FATE, ECOSYSTEMS, *VULNERABILITY INDEX, *LOWER COOK INLET
1405 " BASELINE STUDIES, SHORELINES, SEDIMENTATION, OIL SPILLS, FATE, ECOSYSTEMS, *VULNERABILITY INDEX, *LOWER COOK INLET
1406 " BASELINE STUDIES, GUIDELINES, BIODEGRADATION, MICROORGANISMS, OCS, OFFSHORE DEVELOPMENT, ANALYTICAL TECHNIQUES, NOAA
1409 " BASELINE STUDIES, HYDROCARBONS , TANKERS, BALLAST , BIOLOGICAL EFFECTS, *TRANS-ALASKA PIPELINE, *PORT VALDEZ
1443 " BIBLIOGRAPHIES, OFFSHORE DEVELOPMENT, OCS, ONSHORE IMPACTS, INDUSTRIES, SOCIOECONOMIC EFFECTS, LEGISLATION
R170 " WSF, CRUDE OIL, MARINE ORGANISMS, TOXICITY, BIOASSAY, CHEMICAL ANALYSIS
R184 " OIL FIELDS, DEVELOPMENT , ENVIRONMENTAL EFFECTS, ANIMALS, *FOXES, BASELINE STUDIES
R195 " HYDROCARBONS , SOURCES, FATE, SEDIMENTATION, OCS, *NORTON SOUND
R197 " SEDIMENTATION, BENTHOS, SOURCE IDENTIFICATION, *ORGANIC DETRITUS, *PETROLEUM POLLUTANTS, BASELINE STUDIES, OCS
R199 " MODELS, *SPILL TRAJECTORY, DISTRIBUTION, OCS
1369 ALGAE, ECONOMIC EFFECTS, FISH, INVERTEBRATES, OIL SPILLS, CHILE, *NORTHERN BREEZE SPILL
1188 AMOCO CADIZ SPILL, LIABILITY, *INQUEST
1205 ANALYTICAL TECHNIQUES, MONITORING, TANKERS, BALLAST , OIL DISCHARGES, EQUIPMENT, PATENT, DETECTION
1211 " MONITORING, BIOINDICATORS, BASELINE STUDIES, HYDROCARBONS , BACTERIA, FISH, OCEANS, FRESHWATER
1217 " MONITORING, EQUIPMENT, WASTEWATERS, REFINERIES, PRODUCT INFORMATION, *PHOTOMETRIC ANALYZER
1221 " REMOTE SENSING, SOURCE IDENTIFICATION, OIL SLICKS, EPA, MONITORING, POLLUTION CONTROL, *LASER FLUORESCENCE
1222 " SAMPLING, MICROORGANISMS, BIODEGRADATION, *ENUMERATION, *MOST PROBABLE NUMBER METHOD
1224 " CHROMATOGRAPHY, SPECTROSCOPY, *CASE HISTORIES
1225 " GC/MS, CRUDE OIL, OIL SPILLS, SOURCE IDENTIFICATION
1230 " INDUSTRIES, POLLUTION PREVENTION, WATER QUALITY
1231 " SAMPLING, HYDROCARBONS , *EXXON, *NBS, *INTERLABORATORY COMPARISON
1232 " DETECTION, SPECTROSCOPY, HYDROCARBONS , WASTEWATERS, PATENT
1234 " SAMPLING, CHROMATOGRAPHY, SPECTROSCOPY, STATISTICS
1236 " CHROMATOGRAPHY, HYDROCARBONS , PATENT
1238 " SPECTROMETRY, CHROMATOGRAPHY, *IR ANALYSIS
1241 " CONTAMINANTS, SEAWATER, SURFACTANTS, SOURCE INDENTIFICATION, MEDITERRANEAN SEA, *ELECTROANALYSIS
1242 " SOURCE IDENTIFICATION, CHROMATOGRAPHY, SPECTROSCOPY, *FLUORESCENCE, *IR ANALYSIS
1260 " DISPERSANTS, OIL SLICKS, TOXICITY, ENVIRONMENTAL EFFECTS, *LICENSING, SPILL CLEANUP, BEACH CLEANUP, UK
1283 " WASTEWATERS, REFINERIES, CONTAMINANTS, EPA, API, SAMPLING
1406 " ALASKA , BASELINE STUDIES, GUIDELINES, BIODEGRADATION, MICROORGANISMS, OCS, OFFSHORE DEVELOPMENT, NOAA
1444 " BIBLIOGRAPHIES, MONITORING, DETECTION, SAMPLING, CHEMICAL ANALYSIS, OIL SPILLS, *INDUSTRIAL WASTES
1445 " BIBLIOGRAPHIES, SAMPLING, DETECTION, CHEMICAL ANALYSIS, REMOTE SENSING, OIL SPILLS, *INDUSTRIAL WASTES
R155 " DETECTION, RESIDUAL OILS, SEAWATER, USN

R156 ANALYTICAL TECHNIQUES, CONTAMINANTS, FOSSIL FUELS, SOLUBILITY, CHEMICAL ANALYSIS, SOURCE IDENTIFICATION, *ORGANIC COMPOUNDS
R157 " CONTAMINANTS, SEDIMENTS, ECOSYSTEMS, SEAWATER, FRESHWATER, *IN SITU ANALYSIS
R179 " HYDROCARBONS , BIOASSAY, BIOINDICATORS, CHRONIC EFFECTS, FATE, ECOSYSTEMS, INTERTIDAL ZONE
R184 ANIMALS, ALASKA , OIL FIELDS, DEVELOPMENT , ENVIRONMENTAL EFFECTS, *FOXES, BASELINE STUDIES
1283 API, ANALYTICAL TECHNIQUES, WASTEWATERS, REFINERIES, CONTAMINANTS, EPA, SAMPLING
1368 ARCTIC, SPILL CLEANUP, SOCIAL EFFECTS, ECONOMICS, ENVIRONMENTAL EFFECTS, *REMOTE REGIONS
1427 " FATE, BEHAVIOR, INCINERATION, DISPERSANTS, SPILL CLEANUP, ICE, ESTUARIES, *EXPERIMENTAL OIL SPILLS
R181 ARGO MERCHANT SPILL, CHEMICAL ANALYSIS, SAMPLING, CHRONIC EFFECTS, ENVIRONMENTAL EFFECTS
1239 AROMATIC HYDROCARBONS, MONITORING, PRODUCT INFORMATION, EQUIPMENT, CHROMATOGRAPHY, *BENZENE
1229 " HYDROCARBONS , SOLUBILITY, CHEMICAL ANALYSIS, SURFACTANTS
1349 " WSF, BIOLOGICAL EFFECTS, CHRONIC EFFECTS, FISH, UPTAKE, CRUDE OIL, *BENZENE, *TOLUENE
1354 " TOXICITY, BIOLOGICAL EFFECTS, FISH, UPTAKE, *NAPHTHALENE, *FUNDULUS HETEROCLITUS
1355 " FISH, UPTAKE, BIOLOGICAL EFFECTS, FOOD WEB, *CLUPEA HARENGUS PALLASI, *BENZENE, *BIOMAGNIFICATION
1360 " BIOASSAY, TOXICITY, POLYCHAETES, SOLUBILITY, *PNA, *NEANTHES ARENACEODENTATA
1361 " FISH, WSF, CRUDE OIL, ACCUMULATION, *ONCORHYNCHUS KISUTCH, *PLATICHTYS STELLATA
1365 " BIOLOGICAL EFFECTS, HYDROCARBONS , CRUSTACEANS, BIOASSAY, TOXICITY, METABOLISM, *ESTUARINE SHRIMP
1451 " SEDIMENTS, PAH, SOURCES, FOSSIL FUELS, BUZZARDS BAY, MASSACHUSETTS, *COMBUSTION
R151 " MONITORING, HYDROCARBONS , SEAWATER, SEDIMENTS, MOLLUSKS, SAMPLING
1228 ATLANTIC COAST, HYDROCARBONS , BIOGENIC HYDROCARBONS, OFFSHORE DRILLING, SEDIMENTS, SOURCES, CONTAMINATION, *NOVA SCOTIA
1389 " EIS, OCS, ENVIRONMENTAL EFFECTS, OIL-GAS LEASING, SOCIOECONOMIC EFFECTS
1390 " EIS, OCS, OFFSHORE DEVELOPMENT, ENVIRONMENTAL EFFECTS, OIL-GAS LEASING, ONSHORE IMPACTS
1421 " HYDROCARBONS , UPTAKE, FATE, SEDIMENTATION, BENTHOS, BIOLOGICAL EFFECTS, RHODE ISLAND, MOLLUSKS
R185 " ECOSYSTEMS, COASTS, *PACIFIC NORTHWEST, LOUISIANA, MAINE, FISH, WILDLIFE, OFFSHORE DEVELOPMENT
R190 " BASELINE STUDIES, OCS, HYDROCARBONS , SEDIMENTS, GULF OF MEXICO, *GEOCHEMISTRY
R193 " CONTAMINANTS, FATE, DISPERSION, *CURRENTS
1363 ATLANTIC OCEAN, BIOLOGICAL EFFECTS, PLANKTON, OFFSHORE DEVELOPMENT, HYDROCARBONS , FATE
1211 BACTERIA, ANALYTICAL TECHNIQUES, MONITORING, BIOINDICATORS, BASELINE STUDIES, HYDROCARBONS , FISH, OCEANS, FRESHWATER
1246 " SOURCE IDENTIFICATION, HYDROCARBONS , BIOGENIC HYDROCARBONS, SEAWATER, FRESHWATER, PHYTOPLANKTON, *REVIEW
1271 " HYDROCARBONS , SPILL CLEANUP, BALLAST , BIODEGRADATION, PRODUCT INFORMATION, OIL DISCHARGES, SEAWATER, FRESHWATER
1352 " TOXICITY, WSF, CRUDE OIL, *REFINED OILS, *WEATHERED OILS
1413 " BIODEGRADATION, HYDROCARBONS , MICROORGANISMS, YEASTS, FUNGI, OXIDATION, * REVIEW
1416 " BIODEGRADATION, OXIDATION, HYDROCARBONS , *DESULFOVIBRIO DESULFURICANS, *WADDEN SEA
1417 " BIODEGRADATION, MICROORGANISMS, DISTRIBUTION, USSR, *VARNA BAY
1233 BALLAST , ANALYTICAL TECHNIQUES, MONITORING, TANKERS, OIL DISCHARGES, EQUIPMENT, PATENT, DETECTION
1271 " BACTERIA, HYDROCARBONS , SPILL CLEANUP, BIODEGRADATION, PRODUCT INFORMATION, OIL DISCHARGES, SEAWATER, FRESHWATER
1277 " TANKERS, CRUDE OIL WASHING, OIL DISCHARGES, OIL TERMINALS, OIL TRANSFER, POLLUTION PREVENTION
1316 " OIL-WATER SEPARATION, DESIGN-ENGINEERING, COALESCENCE, EQUIPMENT, USN
1409 " ALASKA , BASELINE STUDIES, HYDROCARBONS , TANKERS, BIOLOGICAL EFFECTS, *TRANS-ALASKA PIPELINE, *PORT VALDEZ
1446 " BIBLIOGRAPHIES, OIL-WATER SEPARATION, EQUIPMENT, SPILL REMOVAL, BILGES, POLLUTION CONTROL
1211 BASELINE STUDIES, BACTERIA, ANALYTICAL TECHNIQUES, MONITORING, BIOINDICATORS, HYDROCARBONS , FISH, OCEANS, FRESHWATER
1227 " HYDROCARBONS , CHEMICAL ANALYSIS, SEDIMENTS, *INTERLABORATORY COMPARISON
1404 " ALASKA , SHORELINES, SEDIMENTATION, OIL SPILLS, FATE, ECOSYSTEMS, *VULNERABILITY INDEX, *LOWER COOK INLET
1405 " ALASKA , SHORELINES, SEDIMENTATION, OIL SPILLS, FATE, ECOSYSTEMS, *VULNERABILITY INDEX, *LOWER COOK INLET
1406 " ANALYTICAL TECHNIQUES, ALASKA , GUIDELINES, BIODEGRADATION, MICROORGANISMS, OCS, OFFSHORE DEVELOPMENT, NOAA
1407 " BENTHOS, HABITATS, MARINE ORGANISMS, ENVIRONMENTAL EFFECTS, OIL TRANSPORT, OIL TRANSFER, PUGET SOUND
1408 " SHORELINES, SEDIMENTATION, OIL SPILLS, ECOSYSTEMS, GULF OF ALASKA, *VULNERABILITY INDEX

1409 " BALLAST , ALASKA , HYDROCARBONS , TANKERS, BIOLOGICAL EFFECTS, *TRANS-ALASKA PIPELINE, *PORT VALDEZ
R184 BASELINE STUDIES, ANIMALS, ALASKA , OIL FIELDS, DEVELOPMENT , ENVIRONMENTAL EFFECTS, *FOXES
R186 " MOLLUSKS, ECOSYSTEMS, REFINERIES, OIL TRANSFER, OIL TERMINALS, BIOLOGICAL EFFECTS, CHRONIC EFFECTS, *PACIFIC NORTHWEST
R188 " OFFSHORE EXPLORATION, OCS, ENVIRONMENTAL EFFECTS, GEORGES BANK, *RISK ANALYSIS
R189 " *GEOLOGIC HAZARDS, NATURAL SEEPAGE, OCS, CALIFORNIA, SANTA BARBARA CHANNEL, SEDIMENTS, DEVELOPMENT
R190 " ATLANTIC COAST, OCS, HYDROCARBONS , SEDIMENTS, GULF OF MEXICO, *GEOCHEMISTRY
R197 " ALASKA , SEDIMENTATION, BENTHOS, SOURCE IDENTIFICATION, *ORGANIC DETRITUS, *PETROLEUM POLLUTANTS, OCS
1191 BAYS, SPILL CLEANUP, PORTS , INTERTIDAL ZONE, FLORIDA, USCG, ENVIRONMENTAL EFFECTS, *PORT SUTTON SPILL
1176 BEACH CLEANUP, OIL SLICKS, SHORELINES, DISPERSANTS, SPILL CLEANUP, UK, *AMLWCH SPILL
1202 " TAR, COASTS, CHESAPEAKE BAY, SOURCE IDENTIFICATION, USCG
1260 " ANALYTICAL TECHNIQUES, DISPERSANTS, OIL SLICKS, TOXICITY, ENVIRONMENTAL EFFECTS, *LICENSING, SPILL CLEANUP, UK
R160 " *SURFACE TREATMENT AGENTS, SURFACTANTS, DISPERSANTS, ENVIRONMENTAL PROTECTION, *FIELD TESTS
1190 BEACHES, OIL SLICKS, SOURCES, MOVEMENT, *TRINIDAD
1247 " SPILL CONTAINMENT, BOOMS, EQUIPMENT, HYDROCARBONS , PATENT
1353 " INVERTEBRATES, SHORELINES, OIL SPILLS, BIOLOGICAL EFFECTS, CHILE, *NORTHERN BREEZE SPILL
R200 BEAUFORT SEA, OIL SPILLS, DRIFT, MOVEMENT, ICE, MODELS
1274 BEHAVIOR, BOUCHARD 65 SPILL, SPILL CLEANUP, ICE, FATE, FUEL OIL, BUZZARDS BAY
1366 " SPREADING, EVAPORATION, *OIL FILM
1411 " BIODEGRADATION, MICROORGANISMS, OIL SPILLS, OIL DISCHARGES, SOURCES, EMULSIFICATION, SPILL CLEANUP, *REVIEW
1419 " FATE, PETROLEUM PRODUCTS, EVAPORATION, SOLUBILITY, WSF, *LIGHT REFINED OILS
1420 " METULA SPILL, CONTAMINATION, ECOSYSTEMS, FATE, MOVEMENT, DISTRIBUTION, *COASTAL ENVIRONMENTS
1425 " MODELS, OIL SPILLS, FATE
1427 " ARCTIC, FATE, INCINERATION, DISPERSANTS, SPILL CLEANUP, ICE, ESTUARIES, *EXPERIMENTAL OIL SPILLS
1428 " OIL SLICKS, SPREADING, DISTRIBUTION, FATE, MODELS, *PREDICTION
R163 " FUEL OIL, MARINE ORGANISMS, *HEAT, SUBLETHAL EFFECTS, *CHEMORECEPTION, MODELS
R169 " FISH, MARINE ORGANISMS, BIOLOGICAL EFFECTS, *CHEMORECEPTION, PACIFIC OCEAN
R198 " MODELS, STATISTICAL ANALYSIS, EMULSIONS, *OIL-SURFACTANT-WATER SYSTEMS
1407 BENTHOS, BASELINE STUDIES, HABITATS, MARINE ORGANISMS, ENVIRONMENTAL EFFECTS, OIL TRANSPORT, OIL TRANSFER, PUGET SOUND
1421 " ATLANTIC COAST, HYDROCARBONS , UPTAKE, FATE, SEDIMENTATION, BIOLOGICAL EFFECTS, RHODE ISLAND, MOLLUSKS
R174 " FOOD WEB, ECOSYSTEMS, COASTS, FISHERIES, MARSHES
R197 " BASELINE STUDIES, ALASKA , SEDIMENTATION, SOURCE IDENTIFICATION, *ORGANIC DETRITUS, *PETROLEUM POLLUTANTS, OCS
R194 BERMUDA, SEDIMENTATION, HYDROCARBONS , FATE, CHROMATOGRAPHY, SPECTROMETRY
1210 BIBLIOGRAPHIES, MONITORING, DETECTION, BIOINDICATORS, MICROORGANISMS, MARINE ORGANISMS
1302 " DISPOSAL , DECOMPOSITION, BIODEGRADATION, SOILS, ENVIRONMENTAL EFFECTS, *CASE STUDIES, *OIL SPILL DEBRIS
1439 " LEGISLATION, OCEANS, OFFSHORE DRILLING, POLLUTION CONTROL
1440 " WASTEWATER TREATMENT, REFINERIES, PETROCHEMICALS, INDUSTRIES, ECONOMICS, POLLUTION CONTROL
1441 " OFFSHORE DRILLING, OIL WELLS, ENVIRONMENTAL EFFECTS, LEGISLATION, EQUIPMENT
1442 " OFFSHORE DEVELOPMENT, DESIGN-ENGINEERING, ENVIRONMENTAL EFFECTS
1443 " ALASKA , OFFSHORE DEVELOPMENT, OCS, ONSHORE IMPACTS, INDUSTRIES, SOCIOECONOMIC EFFECTS, LEGISLATION
1444 " ANALYTICAL TECHNIQUES, MONITORING, DETECTION, SAMPLING, CHEMICAL ANALYSIS, OIL SPILLS, *INDUSTRIAL WASTES
1445 " ANALYTICAL TECHNIQUES, SAMPLING, DETECTION, CHEMICAL ANALYSIS, REMOTE SENSING, OIL SPILLS, *INDUSTRIAL WASTES
1446 " BALLAST , OIL-WATER SEPARATION, EQUIPMENT, SPILL REMOVAL, BILGES, POLLUTION CONTROL
1447 " OCEANS, LEGISLATION, ECONOMICS, UN, *LAW OF THE SEA CONFERENCE
1291 BILGES, OIL-WATER SEPARATION, USN, WASTEWATER TREATMENT, EMULSIONS, *DEMULSIFICATION
1446 " BIBLIOGRAPHIES, BALLAST , OIL-WATER SEPARATION, EQUIPMENT, SPILL REMOVAL, POLLUTION CONTROL
1317 BIOASSAY, OIL-WATER SEPARATION, HYDROCARBONS , FILTRATION, WASTEWATERS, *BIOASSAY EFFLUENT, *SORBENT FIBERS
1360 " AROMATIC HYDROCARBONS, TOXICITY, POLYCHAETES, SOLUBILITY, *PNA, *NEANTHES ARENACEODENTATA
1365 " AROMATIC HYDROCARBONS, BIOLOGICAL EFFECTS, HYDROCARBONS , CRUSTACEANS, TOXICITY, METABOLISM, *ESTUARINE SHRIMP
R161 " WASTEWATER TREATMENT, REFINERIES, MARINE ORGANISMS
R168 " HYDROCARBONS , PETROLEUM PRODUCTS, MOLLUSKS, TOXICITY, DELAWARE BAY, ESTUARIES, *OYSTER INDUSTRY

R170 BIOASSAY, ALASKA , WSF, CRUDE OIL, MARINE ORGANISMS, TOXICITY, CHEMICAL ANALYSIS
R172 " ACUTE EFFECTS, TOXICITY, REFINERIES, WASTEWATERS, FISH
R179 " ANALYTICAL TECHNIQUES, HYDROCARBONS , BIOINDICATORS, CHRONIC EFFECTS, FATE, ECOSYSTEMS, INTERTIDAL ZONE
1222 BIODEGRADATION, ANALYTICAL TECHNIQUES, SAMPLING, MICROORGANISMS, *ENUMERATION, *MOST PROBABLE NUMBER METHOD
1270 " SPILL CLEANUP, DISPERSANTS, MICROORGANISMS, PATENT
1271 " BALLAST , BACTERIA, HYDROCARBONS , SPILL CLEANUP, PRODUCT INFORMATION, OIL DISCHARGES, SEAWATER, FRESHWATER
1272 " FRESHWATER, SEAWATER, SPILL REMOVAL, PATENT, *P & N COMPOSITIONS
1288 " WASTE OIL TREATMENT, PATENT, *CATALYST
1302 " BIBLIOGRAPHIES, DISPOSAL , DECOMPOSITION, SOILS, ENVIRONMENTAL EFFECTS, *CASE STUDIES, *OIL SPILL DEBRIS
1377 " HYDROCARBONS , DETECTION, SOURCES, BIOLOGICAL EFFECTS, OCEANS, FRESHWATER, INDUSTRIES, POLLUTION CONTROL, WASTEWATERS
1406 " BASELINE STUDIES, ANALYTICAL TECHNIQUES, ALASKA , GUIDELINES, MICROORGANISMS, OCS, OFFSHORE DEVELOPMENT, NOAA
1410 " MICROORGANISMS, HYDROCARBONS , SPILL CLEANUP
1411 " BEHAVIOR, MICROORGANISMS, OIL SPILLS, OIL DISCHARGES, SOURCES, EMULSIFICATION, SPILL CLEANUP, *REVIEW
1412 " HYDROCARBONS , OIL SPILLS, OIL SLICKS, DISPERSION, EVAPORATION, BOOK REVIEW
1413 " BACTERIA, HYDROCARBONS , MICROORGANISMS, YEASTS, FUNGI, OXIDATION, * REVIEW
1414 " MICROORGANISMS, SPILL CLEANUP, *FERTILIZER, *NITROGEN, *PHOSPHORUS
1415 " ACUTE EFFECTS, MICROORGANISMS, OCS, OIL SPILLS, CHRONIC EFFECTS, SAMPLING
1416 " BACTERIA, OXIDATION, HYDROCARBONS , *DESULFOVIBRIO DESULFURICANS, *WADDEN SEA
1417 " BACTERIA, MICROORGANISMS, DISTRIBUTION, USSR, *VARNA BAY
1418 " HYDROCARBONS , TAR, NATURAL SEEPAGE, CHROMATOGRAPHY, *HYPERSALINE ENVIRONMENTS
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1226 BIOGENIC HYDROCARBONS, ATLANTIC COAST, HYDROCARBONS , OFFSHORE DRILLING, SEDIMENTS, SOURCES, CONTAMINATION, *NOVA SCOTIA
1239 " CHROMATOGRAPHY, HYDROCARBONS , MOLLUSKS, *CHITON
1246 " BACTERIA, SOURCE IDENTIFICATION, HYDROCARBONS , SEAWATER, FRESHWATER, PHYTOPLANKTON, *REVIEW
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1177 BIOLOGICAL EFFECTS, OIL SLICKS, OIL TERMINALS, DISPERSANTS, BIRDS, ESTUARIES, COASTS, UK, *AMLWCH SPILL
1348 " TOXICITY, FISH, REPRODUCTION, CRUDE OIL, *RAINBOW TROUT
1349 " AROMATIC HYDROCARBONS, WSF, CHRONIC EFFECTS, FISH, UPTAKE, CRUDE OIL, *BENZENE, *TOLUENE
1350 " BIRDS, FUEL OIL, CRUDE OIL, TOXICITY, *HATCHABILITY, *INCUBATION STAGES
1353 " BEACHES, INVERTEBRATES, SHORELINES, OIL SPILLS, CHILE, *NORTHERN BREEZE SPILL
1354 " AROMATIC HYDROCARBONS, TOXICITY, FISH, UPTAKE, *NAPHTHALENE, *FUNDULUS HETEROCLITUS
1355 " AROMATIC HYDROCARBONS, FISH, UPTAKE, FOOD WEB, *CLUPEA HARENGUS PALLASI, *BENZENE, *BIOMAGNIFICATION
1359 " ENVIRONMENTAL EFFECTS, OIL SPILLS, BIRDS, FISH
1362 " HABITATS, INTERTIDAL ZONE, MARINE ORGANISMS, OIL SPILLS, CHILE, *NORTHERN BREEZE SPILL
1363 " ATLANTIC OCEAN, PLANKTON, OFFSHORE DEVELOPMENT, HYDROCARBONS , FATE
1365 " BIOASSAY, AROMATIC HYDROCARBONS, HYDROCARBONS , CRUSTACEANS, TOXICITY, METABOLISM, *ESTUARINE SHRIMP
1372 " ENVIRONMENTAL PROTECTION, POLLUTION PREVENTION, SHIPS, MONITORING, UN, *CONFERENCE, *GESAMP
1374 " ENVIRONMENTAL EFFECTS, OIL SPILLS, OFFSHORE EXPLORATION, OFFSHORE DEVELOPMENT, WASTEWATERS, UN, *GESAMP
1377 " BIODEGRADATION, HYDROCARBONS , DETECTION, SOURCES, OCEANS, FRESHWATER, INDUSTRIES, POLLUTION CONTROL, WASTEWATERS
1378 " HYDROCARBONS , PAH, SEDIMENTS, MARINE ORGANISMS, TAR, SOURCES, TANKERS, MEDITERRANEAN SEA
1379 " SOURCES, TOXICITY, OCEANS, PETROLEUM PRODUCTS, CRUDE OIL, FOOD WEB, PHYTOPLANKTON, *NEKTON
1384 " OFFSHORE DEVELOPMENT, DRILLING , OCEANS, ENVIRONMENTAL MANAGEMENT, SOURCES, REGULATIONS, MONITORING
1409 " BASELINE STUDIES, BALLAST , ALASKA , HYDROCARBONS , TANKERS, *TRANS-ALASKA PIPELINE, *PORT VALDEZ
1421 " BENTHOS, ATLANTIC COAST, HYDROCARBONS , UPTAKE, FATE, SEDIMENTATION, RHODE ISLAND, MOLLUSKS
1447 " ENVIRONMENTAL EFFECTS, DEVELOPMENT , *ENCYCLOPEDIA
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R176 " BIOINDICATORS, CONTAMINANTS, *AQUATIC ORGANISMS, RESOURCE MANAGEMENT
R177 " CRUDE OIL, HYDROCARBONS , TOXICITY, BIRDS, REPRODUCTION, SUBLETHAL EFFECTS, UPTAKE, *EGGS

R178 BIOLOGICAL EFFECTS, WSF, HYDROCARBONS , SUBLETHAL EFFECTS, MOLLUSKS, CRUSTACEANS, FISH, TOXICITY, *DEFENSE MECHANISMS
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1295 BIOLOGICAL TREATMENT, WASTEWATERS, PETROCHEMICALS, MODELS, COST ANALYSIS, EUROPE
1177 BIRDS, BIOLOGICAL EFFECTS, OIL SLICKS, OIL TERMINALS, DISPERSANTS, ESTUARIES, COASTS, UK, *AMLWCH SPILL
1180 " OIL SPILLS, UK, TANKERS, OIL TRANSFER, ENVIRONMENTAL EFFECTS, *CHRISTOS BITAS SPILL, *SALVAGE OPERATIONS
1201 " TAR, COASTS, ENVIRONMENTAL EFFECTS, SWEDEN
1350 " BIOLOGICAL EFFECTS, FUEL OIL, CRUDE OIL, TOXICITY, *HATCHABILITY, *INCUBATION STAGES
1356 " ACUTE EFFECTS, MORTALITY, SUBLETHAL EFFECTS, CONTAMINATION, HABITATS, *WATERFOWL
1358 " BIOLOGICAL EFFECTS, ENVIRONMENTAL EFFECTS, OIL SPILLS, FISH
1359 " CONTAMINATION, HYDROCARBONS , MORTALITY, TOXICITY, SURFACTANTS, SOURCES, FATE, *REVIEW
1364 " MORTALITY, *OILED BIRDS , *SUCCESSFUL REARING, *CAPTIVITY
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1391 BLM, ALASKA , EIS, OIL-GAS LEASING, OCS, OFFSHORE DEVELOPMENT, *LOWER COOK INLET
1392 " ALASKA , EIS, OIL-GAS LEASING, OCS, OFFSHORE DEVELOPMENT, *LOWER COOK INLET
1393 " ALASKA , EIS, OIL-GAS LEASING, OCS, OFFSHORE DEVELOPMENT, *LOWER COOK INLET
1344 BLOWOUT PREVENTION, DRILLING , INLAND, REGULATIONS, GOVERNMENT AGENCIES, POLLUTION PREVENTION, CONTINGENCY PLANNING, CANADA
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1204 " SPILL CLEANUP, OIL WELLS, LAKES , LOUISIANA, USCG, DOE, *STRATEGIC PETROLEUM RESERVE
1342 " POLLUTION CONTROL, PATENT, EQUIPMENT, DESIGN-ENGINEERING
1381 " HYDROCARBONS , SEDIMENTS, ENVIRONMENTAL EFFECTS, CHEMICAL ANALYSIS, TEXAS, GULF OF MEXICO
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1412 " BIODEGRADATION, HYDROCARBONS , OIL SPILLS, OIL SLICKS, DISPERSION, EVAPORATION
1448 " SEDIMENTS, CHEMICAL ANALYSIS, CONTAMINANTS
1247 BOOMS, BEACHES, SPILL CONTAINMENT, EQUIPMENT, HYDROCARBONS , PATENT
1248 " SPILL CONTAINMENT, PLATFORMS, PATENT, EQUIPMENT
1249 " SPILL CONTAINMENT, POLLUTION CONTROL, PATENT, EQUIPMENT
1250 " SPILL CONTAINMENT, POLLUTION CONTROL, EQUIPMENT, PRODUCT INFORMATION, US, CANADA, *FIELD TRIALS
1268 " SPILL CLEANUP, SKIMMERS, DISPERSANTS, CONTINGENCY PLANNING, GOVERNMENT AGENCIES, TANKERS, COASTS, IRELAND
1331 " PRODUCT INFORMATION, EQUIPMENT
1332 " PERSONNEL TRAINING, DISPERSANTS, IMCO, MANUALS, SKIMMERS, SINKING AGENTS, SORBENTS, SPILL CLEANUP
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1237 " PETROLEUM PRODUCTS, *SURFACE WATERS
1244 " SOURCE IDENTIFICATION, CHROMATOGRAPHY, TAR, CRUDE OIL, FUEL OIL, *HIGH SPEED GEL PERMEATION METHOD

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1362 " BIOLOGICAL EFFECTS, HABITATS, INTERTIDAL ZONE, MARINE ORGANISMS, OIL SPILLS, *NORTHERN BREEZE SPILL
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1310 COALESCENCE, OIL-WATER SEPARATION, EMULSIONS, PATENT, *SILICONE-COATED FIBERS
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1183 " OIL SPILLS, SPILL CLEANUP, GOVERNMENT AGENCIES, ENGLAND, *ELENI V
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R180 " CALIFORNIA, WASTEWATERS, HYDROCARBONS , FOOD WEB, MARINE ORGANISMS, *POLLUTANT FLOW
R193 " ATLANTIC COAST, FATE, DISPERSION, *CURRENTS
1184 CONTAMINATION, SPILL CLEANUP, OIL DISCHARGES, LEAKAGE, SHIPS, IRELAND, ENVIRONMENTAL EFFECTS
1228 " BIOGENIC HYDROCARBONS, ATLANTIC COAST, HYDROCARBONS , OFFSHORE DRILLING, SEDIMENTS, SOURCES, *NOVA SCOTIA
1233 " CHROMATOGRAPHY, CHEMICAL ANALYSIS, FUEL OIL, FOOD WEB, *DIBENZOTHIOPHENES, *SEAFOOD TAINTING
1356 " BIRDS, ACUTE EFFECTS, MORTALITY, SUBLETHAL EFFECTS, HABITATS, *WATERFOWL
1359 " BIRDS, HYDROCARBONS , MORTALITY, TOXICITY, SURFACTANTS, SOURCES, FATE, *REVIEW
1373 " MEDITERRANEAN SEA, SHORELINES, SOURCES, TAR, POLLUTION CONTROL, ENVIRONMENTAL DETERIORATION
1380 " OIL SHALE, GROUNDWATER, *LEACHING
1420 " BEHAVIOR, METULA SPILL, ECOSYSTEMS, FATE, MOVEMENT, DISTRIBUTION, *COASTAL ENVIRONMENTS
1429 " LEGISLATION, OCEANS, ENVIRONMENTAL EFFECTS, MONITORING, NOAA, US, *RESEARCH
R173 " CHRONIC EFFECTS, CHEMICAL EFFECTS, BIOLOGICAL EFFECTS
1268 CONTINGENCY PLANNING, COASTS, BOOMS, SPILL CLEANUP, SKIMMERS, DISPERSANTS, GOVERNMENT AGENCIES, TANKERS, IRELAND
1333 " CANADA, PERSONNEL TRAINING, POLLUTION CONTROL, OIL INDUSTRY, *FIELD EXERCISE
1334 " POLLUTION PREVENTION, SPILL CLEANUP, GOVERNMENT AGENCIES, ENGLAND
1335 " POLLUTION CONTROL, MONITORING, *PERSIAN GULF, *ACTION PLAN
1336 " ALASKA , US, REGULATIONS, POLLUTION PREVENTION, POLLUTION CONTROL, OIL WELLS, INLAND
1344 " CANADA, BLOWOUT PREVENTION, DRILLING , INLAND, REGULATIONS, GOVERNMENT AGENCIES, POLLUTION PREVENTION
1430 " LEGISLATION, HEALTH HAZARDS, POLLUTION CONTROL, ENVIRONMENTAL PROTECTION, OCEANS, FRESHWATER, US
1432 " POLLUTION PREVENTION, GUIDELINES, REGULATIONS, SHIPS, SPILL CLEANUP, UK
R164 " OIL SPILLS, US, *RESEARCH FUNDS
1295 COST ANALYSIS, BIOLOGICAL TREATMENT, WASTEWATERS, PETROCHEMICALS, MODELS, EUROPE
1225 CRUDE OIL, ANALYTICAL TECHNIQUES, GC/MS, OIL SPILLS, SOURCE IDENTIFICATION
1244 " CHROMATOGRAPHY, CHEMICAL ANALYSIS, SOURCE IDENTIFICATION, TAR, FUEL OIL, *HIGH SPEED GEL PERMEATION METHOD
1259 " SPILL REMOVAL, DISPERSANTS, PETROLEUM PRODUCTS, PATENT
1279 " STORAGE, OIL TRANSFER, PIPELINES, LOUISIANA, FEA, *STRATEGIC PETROLEUM RESERVE
1321 " OIL-WATER SEPARATION, EMULSIONS, PATENT, *DEMULSIFIERS
1348 " BIOLOGICAL EFFECTS, TOXICITY, FISH, REPRODUCTION, *RAINBOW TROUT
1349 " CHRONIC EFFECTS, BIOLOGICAL EFFECTS, AROMATIC HYDROCARBONS, WSF, FISH, UPTAKE, *BENZENE, *TOLUENE
1350 " BIRDS, BIOLOGICAL EFFECTS, FUEL OIL, TOXICITY, *HATCHABILITY, *INCUBATION STAGES
1351 " EMULSIONS, DISPERSANTS, METABOLISM, FISH, SUBLETHAL EFFECTS, TOXICITY, WEATHERING
1352 " BACTERIA, TOXICITY, WSF, *REFINED OILS, *WEATHERED OILS
1357 " ACUTE EFFECTS, DISPERSANTS, FISH, *SALMO GAIRDNERI, *SERUM GLUCOSE AND SODIUM, *GILL MORPHOLOGY
1361 " AROMATIC HYDROCARBONS, FISH, WSF, ACCUMULATION, *ONCORHYNCHUS KISUTCH, *PLATICHTYS STELLATA
1379 " BIOLOGICAL EFFECTS, SOURCES, TOXICITY, OCEANS, PETROLEUM PRODUCTS, FOOD WEB, PHYTOPLANKTON, *NEKTON
1394 " EIS, STORAGE, ENVIRONMENTAL EFFECTS, *STRATEGIC PETROLEUM RESERVE
1395 " EIS, STORAGE, ENVIRONMENTAL EFFECTS, LOUISIANA, *STRATEGIC PETROLEUM RESERVE
1396 " EIS, STORAGE, ENVIRONMENTAL EFFECTS, LOUISIANA, *STRATEGIC PETROLEUM RESERVE
1397 " EIS, STORAGE, ENVIRONMENTAL EFFECTS, LOUISIANA, *STRATEGIC PETROLEUM RESERVE
R166 " WSF, PETROLEUM PRODUCTS, TOXICITY, MARINE ORGANISMS
R172 " CHEMICAL ANALYSIS, BIOASSAY, ALASKA , WSF, MARINE ORGANISMS, TOXICITY
R177 " BIRDS, BIOLOGICAL EFFECTS, HYDROCARBONS , TOXICITY, REPRODUCTION, SUBLETHAL EFFECTS, UPTAKE, *EGGS
1277 CRUDE OIL WASHING, BALLAST , TANKERS, OIL DISCHARGES, OIL TERMINALS, OIL TRANSFER, POLLUTION PREVENTION
1431 " SAFETY, TANKERS, IMCO, POLLUTION PREVENTION, SEGREGATED BALLAST, *INERT GAS SYSTEMS, GUIDELINES, SURVEILLANCE
1365 CRUSTACEANS, BIOLOGICAL EFFECTS, BIOASSAY, AROMATIC HYDROCARBONS, HYDROCARBONS , TOXICITY, METABOLISM, *ESTUARINE SHRIMP
R178 " BIOLOGICAL EFFECTS, WSF, HYDROCARBONS , SUBLETHAL EFFECTS, MOLLUSKS, FISH, TOXICITY, *DEFENSE MECHANISMS

1302 DECOMPOSITION, BIODEGRADATION, BIBLIOGRAPHIES, DISPOSAL , SOILS, ENVIRONMENTAL EFFECTS, *CASE STUDIES, *OIL SPILL DEBRIS
1252 DEEPWATER PORTS, SKIMMERS, EQUIPMENT, DESIGN-ENGINEERING, PRODUCT INFORMATION, IRELAND, *BAY SKIMMER
1387 " COMPENSATION, *LOOP, *SEADOCK, SPILL CLEANUP, POLLUTION PREVENTION, GULF OF MEXICO
1450 " PORTS , OIL DISCHARGES, SAFETY, DEVELOPMENT , NEW YORK
2168 DELAWARE BAY, BIOASSAY, HYDROCARBONS , PETROLEUM PRODUCTS, MOLLUSKS, TOXICITY, ESTUARIES, *OYSTER INDUSTRY
1219 DESIGN-ENGINEERING, MONITORING, WASTEWATERS, SLUDGE , *LASERS, *OIL FILM, PATENT
1251 " EQUIPMENT, PRODUCT INFORMATION, SKIMMERS, SPILL REMOVAL, *SSACV OIL SKIMMER, PATENT
1252 " DEEPWATER PORTS, SKIMMERS, EQUIPMENT, PRODUCT INFORMATION, IRELAND, *BAY SKIMMER
1253 " SKIMMERS, EQUIPMENT, PRODUCT INFORMATION, SPILL CLEANUP, IRELAND, *BANTRY BAY
1254 " SPILL REMOVAL, EQUIPMENT, SKIMMERS, PRODUCT INFORMATION
1255 " EQUIPMENT, POLLUTION PREVENTION, SPILL CONTAINMENT, SPILL REMOVAL, PRODUCT INFORMATION
1256 " SKIMMERS, EQUIPMENT, SPILL REMOVAL, PRODUCT INFORMATION, *DYNAMIC OIL SKIMMER
1257 " SPILL CLEANUP, PRODUCT INFORMATION, EQUIPMENT, SKIMMERS, EKOFISK BLOWOUT
1258 " SPILL REMOVAL, EQUIPMENT, PATENT
1261 " SPILL REMOVAL, SKIMMERS, EQUIPMENT, OIL-WATER SEPARATION, PATENT, *VACUUMING
1262 " SPILL REMOVAL, SKIMMERS, OIL-WATER SEPARATION, EQUIPMENT, PATENT
1263 " HYDROCARBONS , SPILL CLEANUP, EQUIPMENT, SKIMMERS, PATENT
1265 " DISPERSION, SURFACTANTS, OIL SPILLS, PATENT, EQUIPMENT
1273 " SPILL REMOVAL, EQUIPMENT, *OIL MOP, PATENT
1296 " WASTE OIL, DISPOSAL , ENVIRONMENTAL EFFECTS, VEGETATION, SOIL, *LAND APPLICATION
1308 " OIL-WATER SEPARATION, FILTRATION, PATENT, EQUIPMENT
1313 " OIL-WATER SEPARATION, WASTEWATER TREATMENT, PATENT, EQUIPMENT
1316 " COALESCENCE, BALLAST , OIL-WATER SEPARATION, EQUIPMENT, USN
1342 " BLOWOUTS, POLLUTION CONTROL, PATENT, EQUIPMENT
1345 " PIPELINES, LEAKAGE, DETECTION, EQUIPMENT, PATENT
1386 " PLATFORMS, OFFSHORE DEVELOPMENT, SAFETY, POLLUTION CONTROL, REGULATIONS
1442 " BIBLIOGRAPHIES, OFFSHORE DEVELOPMENT, ENVIRONMENTAL EFFECTS
1139 DETECTION, LEAKAGE, SPILL CLEANUP, USCG, NEW YORK
1205 " BALLAST , ANALYTICAL TECHNIQUES, MONITORING, TANKERS, OIL DISCHARGES, EQUIPMENT, PATENT
1206 " MONITORING, WASTEWATERS, OIL DISCHARGES, PRODUCT INFORMATION, EQUIPMENT
1207 " MONITORING, EQUIPMENT, HYDROCARBONS , PRODUCT INFORMATION, *FLUOROMETRY, *PETRO-TRACT SYSTEM
1210 " BIBLIOGRAPHIES, MONITORING, BIOINDICATORS, MICROORGANISMS, MARINE ORGANISMS
1213 " MONITORING, LEAKAGE, EQUIPMENT, PATENT, HYDROCARBONS
1214 " MONITORING, PIPELINES, OIL TRANSFER, LEAKAGE, PATENT
1215 " CONTAMINANTS, MONITORING, OCEANS, SORBENTS
1232 " ANALYTICAL TECHNIQUES, SPECTROSCOPY, HYDROCARBONS , WASTEWATERS, PATENT
1245 " SOURCE IDENTIFICATION, FUEL OIL, PETROLEUM PRODUCTS, SPECTROMETRY, MODELS, STATISTICAL ANALYSIS
1278 " PIPELINES, LEAKAGE, PATENT
1343 " EQUIPMENT, POLLUTION CONTROL, FRANCE, OIL-WATER SEPARATION, SKIMMERS, SORBENTS, SINKING AGENTS, OIL DISCHARGES, PRODUCT INFORMATION
1345 " DESIGN-ENGINEERING, PIPELINES, LEAKAGE, EQUIPMENT, PATENT
1377 " BIOLOGICAL EFFECTS, BIODEGRADATION, HYDROCARBONS , SOURCES, OCEANS, FRESHWATER, INDUSTRIES, POLLUTION CONTROL, WASTEWATERS
1444 " CHEMICAL ANALYSIS, BIBLIOGRAPHIES, ANALYTICAL TECHNIQUES, MONITORING, SAMPLING, OIL SPILLS, *INDUSTRIAL WASTES
1445 " CHEMICAL ANALYSIS, BIBLIOGRAPHIES, ANALYTICAL TECHNIQUES, SAMPLING, REMOTE SENSING, OIL SPILLS, *INDUSTRIAL WASTES
2155 " ANALYTICAL TECHNIQUES, RESIDUAL OILS, SEAWATER, USN
1382 DEVELOPMENT , ECONOMIC EFFECTS, INSURANCE, OIL INDUSTRY, TANKERS, OIL SPILLS, *CLAIMS
1449 " BIOLOGICAL EFFECTS, ENVIRONMENTAL EFFECTS, *ENCYCLOPEDIA
1450 " DEEPWATER PORTS, PORTS , OIL DISCHARGES, SAFETY, NEW YORK
2184 " BASELINE STUDIES, ANIMALS, ALASKA , OIL FIELDS, ENVIRONMENTAL EFFECTS, *FOXES
2189 " CALIFORNIA, BASELINE STUDIES, *GEOLOGIC HAZARDS, NATURAL SEEPAGE, OCS, SANTA BARBARA CHANNEL, SEDIMENTS
1176 DISPERSANTS, BEACH CLEANUP, OIL SLICKS, SHORELINES, SPILL CLEANUP, UK, *AMLWCH SPILL
1177 " COASTS, BIRDS, BIOLOGICAL EFFECTS, OIL SLICKS, OIL TERMINALS, ESTUARIES, UK, *AMLWCH SPILL
1179 " OIL SPILLS, UK, TANKERS, OIL TRANSFER, *CHRISTOS BITAS SPILL
1199 " SPILL CLEANUP, TANKERS, HARBORS, *SOUTH AFRICA , *STAWANDA SPILL
1259 " CRUDE OIL, SPILL REMOVAL, PETROLEUM PRODUCTS, PATENT
1260 " BEACH CLEANUP, ANALYTICAL TECHNIQUES, OIL SLICKS, TOXICITY, ENVIRONMENTAL EFFECTS, *LICENSING, SPILL CLEANUP, UK
1267 " SPILL CLEANUP, EMULSIFIERS, PATENT
1268 " CONTINGENCY PLANNING, COASTS, BOOMS, SPILL CLEANUP, SKIMMERS, GOVERNMENT AGENCIES, TANKERS, IRELAND
1270 " BIODEGRADATION, SPILL CLEANUP, MICROORGANISMS, PATENT
1332 " BOOMS, PERSONNEL TRAINING, IMCO, MANUALS, SKIMMERS, SINKING AGENTS, SORBENTS, SPILL CLEANUP

1351 DISPERSANTS, CRUDE OIL, EMULSIONS, METABOLISM, FISH, SUBLETHAL EFFECTS, TOXICITY, WEATHERING
1357 " CRUDE OIL, ACUTE EFFECTS, FISH, *SALMO GAIRDNERI, *SERUM GLUCOSE AND SODIUM, *GILL MORPHOLOGY
1427 " BEHAVIOR, ARCTIC, FATE, INCINERATION, SPILL CLEANUP, ICE, ESTUARIES, *EXPERIMENTAL OIL SPILLS
R160 " BEACH CLEANUP, *SURFACE TREATMENT AGENTS, SURFACTANTS, ENVIRONMENTAL PROTECTION, *FIELD TESTS
1208 DISPERSION, MONITORING, EQUIPMENT, PRODUCT INFORMATION, *OIL-IN-WATER
1265 " DESIGN-ENGINEERING, SURFACTANTS, OIL SPILLS, PATENT, EQUIPMENT
1266 " SLUDGE , PRECIPITATION, FILTRATION, PATENT
1412 " BOOK REVIEW, BIODEGRADATION, HYDROCARBONS , OIL SPILLS, OIL SLICKS, EVAPORATION
1426 " CONTAMINANTS, MODELS, ESTUARIES
R193 " CONTAMINANTS, ATLANTIC COAST, FATE, *CURRENTS
1294 DISPOSAL , WASTE OIL, *LANDFILLS, EMULSIONS, INDUSTRIES, *LEACHING, *PILOT STUDY
1296 " DESIGN-ENGINEERING, WASTE OIL, ENVIRONMENTAL EFFECTS, VEGETATION, SOIL, *LAND APPLICATION
1332 " DECOMPOSITION, BIODEGRADATION, BIBLIOGRAPHIES, SOILS, ENVIRONMENTAL EFFECTS, *CASE STUDIES, *OIL SPILL DEBRIS
1388 " EXPLORATION , PRODUCTION , ECONOMIC EFFECTS, LEGISLATION, REGULATIONS, OIL SPILLS, *OVERVIEW
1328 DISTILLATION, WASTE OIL, RECLAMATION, REUSE, EVAPORATION, EQUIPMENT, PATENT
1331 " RECLAMATION, WASTE OIL, LUBRICATING OIL, SOLVENTS, PATENT, *VACUUM STRIPPING
1417 DISTRIBUTION, BIODEGRADATION, BACTERIA, MICROORGANISMS, USSR, *VARNA BAY
1420 " CONTAMINATION, BEHAVIOR, METULA SPILL, ECOSYSTEMS, FATE, MOVEMENT, *COASTAL ENVIRONMENTS
1428 " BEHAVIOR, OIL SLICKS, SPREADING, FATE, MODELS, *PREDICTION
R196 " BIOGENIC HYDROCARBONS, FATE, PETROCHEMICALS, SEDIMENTATION, OCEANS, GC/MS
R199 " ALASKA , MODELS, *SPILL TRAJECTORY, OCS
1203 DOE, BLOWOUTS, SPILL CONTAINMENT, SPILL CLEANUP, OIL WELLS, LAKES , LOUISIANA, USCG, *STRATEGIC PETROLEUM RESERVE
1204 " BLOWOUTS, SPILL CLEANUP, OIL WELLS, LAKES , LOUISIANA, USCG, *STRATEGIC PETROLEUM RESERVE
1367 DRIFT, OIL SLICKS, SPREADING, FATE
R200 " BEAUFORT SEA, OIL SPILLS, MOVEMENT, ICE, MODELS
1344 DRILLING , CONTINGENCY PLANNING, CANADA, BLOWOUT PREVENTION, INLAND, REGULATIONS, GOVERNMENT AGENCIES, POLLUTION PREVENTION
1384 " BIOLOGICAL EFFECTS, OFFSHORE DEVELOPMENT, OCEANS, ENVIRONMENTAL MANAGEMENT, SOURCES, REGULATIONS, MONITORING
1240 ECHINODERMS, CHROMATOGRAPHY, HYDROCARBONS , BIOGENIC HYDROCARONS, *SEA URCHIN GONADS
1369 ECONOMIC EFFECTS, CHILE, ALGAE, FISH, INVERTEBRATES, OIL SPILLS, *NORTHERN BREEZE SPILL
1382 " DEVELOPMENT , INSURANCE, OIL INDUSTRY, TANKERS, OIL SPILLS, *CLAIMS
1383 " OFFSHORE DEVELOPMENT, *RISK ANALYSIS, PLATFORMS, SAFETY, OIL INDUSTRY, NORTH SEA
1386 " DISPOSAL , EXPLORATION , PRODUCTION , LEGISLATION, REGULATIONS, OIL SPILLS, *OVERVIEW
R187 " BIOLOGICAL EFFECTS, GEORGES BANK, OFFSHORE DEVELOPMENT, FISHERIES, EIS
1333 ECONOMICS, POLLUTION CONTROL, ENVIRONMENTAL PROTECTION, MEDITERRANEAN SEA, *TREATY, *STANDARDS
1368 " ARCTIC, SPILL CLEANUP, SOCIAL EFFECTS, ENVIRONMENTAL EFFECTS, *REMOTE REGIONS
1440 " BIBLIOGRAPHIES, WASTEWATER TREATMENT, REFINERIES, PETROCHEMICALS, INDUSTRIES, POLLUTION CONTROL
1447 " BIBLIOGRAPHIES, OCEANS, LEGISLATION, UN, *LAW OF THE SEA CONFERENCE
1373 ECOSYSTEMS, RECOVERY, ENVIRONMENTAL DETERIORATION, RESOURCE MANAGEMENT, RESTORATION
1434 " BASELINE STUDIES, ALASKA , SHORELINES, SEDIMENTATION, OIL SPILLS, FATE, *VULNERABILITY INDEX, *LOWER COOK INLET
1435 " BASELINE STUDIES, ALASKA , SHORELINES, SEDIMENTATION, OIL SPILLS, FATE, *VULNERABILITY INDEX, *LOWER COOK INLET
1438 " BASELINE STUDIES, SHORELINES, SEDIMENTATION, OIL SPILLS, GULF OF ALASKA, *VULNERABILITY INDEX
1420 " DISTRIBUTION, CONTAMINATION, BEHAVIOR, METULA SPILL, FATE, MOVEMENT, *COASTAL ENVIRONMENTS
R157 " CONTAMINANTS, ANALYTICAL TECHNIQUES, SEDIMENTS, SEAWATER, FRESHWATER, *IN SITU ANALYSIS
R174 " COASTS, BENTHOS, FOOD WEB, FISHERIES, MARSHES
R179 " CHRONIC EFFECTS, BIOASSAY, ANALYTICAL TECHNIQUES, HYDROCARBONS , BIOINDICATORS, FATE, INTERTIDAL ZONE
R185 " COASTS, ATLANTIC COAST, *PACIFIC NORTHWEST, LOUISIANA, MAINE, FISH, WILDLIFE, OFFSHORE DEVELOPMENT
R186 " CHRONIC EFFECTS, BIOLOGICAL EFFECTS, BASELINE STUDIES, MOLLUSKS, REFINERIES, OIL TRANSFER, OIL TERMINALS, *PACIFIC NORTHWEST
1389 EIS, ATLANTIC COAST, OCS, ENVIRONMENTAL EFFECTS, OIL-GAS LEASING, SOCIOECONOMIC EFFECTS
1390 " ATLANTIC COAST, OCS, OFFSHORE DEVELOPMENT, ENVIRONMENTAL EFFECTS, OIL-GAS LEASING, ONSHORE IMPACTS
1391 " BLM, ALASKA , OIL-GAS LEASING, OCS, OFFSHORE DEVELOPMENT, *LOWER COOK INLET
1392 " BLM, ALASKA , OIL-GAS LEASING, OCS, OFFSHORE DEVELOPMENT, *LOWER COOK INLET

1393 EIS, BLM, ALASKA , OIL-GAS LEASING, OCS, OFFSHORE DEVELOPMENT, *LOWER COOK INLET
1394 " CRUDE OIL, STORAGE, ENVIRONMENTAL EFFECTS, *STRATEGIC PETROLEUM RESERVE
1395 " CRUDE OIL, STORAGE, ENVIRONMENTAL EFFECTS, LOUISIANA, *STRATEGIC PETROLEUM RESERVE
1396 " CRUDE OIL, STORAGE, ENVIRONMENTAL EFFECTS, LOUISIANA, *STRATEGIC PETROLEUM RESERVE
1397 " CRUDE OIL, STORAGE, ENVIRONMENTAL EFFECTS, LOUISIANA, *STRATEGIC PETROLEUM RESERVE
1398 " STORAGE, OIL TRANSPORT, OIL SPILLS, *STRATEGIC PETROLEUM RESERVE
1399 " STORAGE, ENVIRONMENTAL EFFECTS, *STRATEGIC PETROLEUM RESERVE
1400 " STORAGE, OIL SPILLS, *BRINE SPILLS, *RISK ANALYSIS, *STRATEGIC PETROLEUM RESERVE
1401 " STORAGE, ENVIRONMENTAL EFFECTS, *STRATEGIC PETROLEUM RESERVE
1402 " STORAGE, OIL SPILLS, OIL TRANSPORT, OIL TERMINALS, *RISK ANALYSIS, *STRATEGIC PETROLEUM RESERVE
1403 " STORAGE, ENVIRONMENTAL EFFECTS, OIL SPILLS, *RISK ANALYSIS, *STRATEGIC PETROLEUM RESERVE
R187 " ECONOMIC EFFECTS, BIOLOGICAL EFFECTS, GEORGES BANK, OFFSHORE DEVELOPMENT, FISHERIES
1257 EKOFISK BLOWOUT, DESIGN-ENGINEERING, SPILL CLEANUP, PRODUCT INFORMATION, EQUIPMENT, SKIMMERS
1411 EMULSIFICATION, BIODEGRADATION, BEHAVIOR, MICROORGANISMS, OIL SPILLS, OIL DISCHARGES, SOURCES, SPILL CLEANUP, *REVIEW
1267 EMULSIFIERS, DISPERSANTS, SPILL CLEANUP, PATENT
1292 " WASTEWATER TREATMENT, FLOTATION, *COAGULATION, OIL-WATER SEPARATION
1312 " OIL-WATER SEPARATION, SOLVENTS, EQUIPMENT, PATENT
1290 EMULSIONS, WASTE OIL TREATMENT, ULTRAFILTRATION, WASTEWATERS
1291 " BILGES, OIL-WATER SEPARATION, USN, WASTEWATER TREATMENT, *DEMULSIFICATION
1294 " DISPOSAL , WASTE OIL, *LANDFILLS, INDUSTRIES, *LEACHING, *PILOT STUDY
1310 " COALESCENCE, OIL-WATER SEPARATION, PATENT, *SILICONE-COATED FIBERS
1318 " ADSORPTION, OIL-WATER SEPARATION, PATENT, *SORBENT POWDER
1321 " CRUDE OIL, OIL-WATER SEPARATION, PATENT, *DEMULSIFIERS
1323 " OIL-WATER SEPARATION, EQUIPMENT, PATENT, EVAPORATION, *CONDENSATION
1324 " OIL-WATER SEPARATION, *REVIEW
1351 " DISPERSANTS, CRUDE OIL, METABOLISM, FISH, SUBLETHAL EFFECTS, TOXICITY, WEATHERING
R198 " BEHAVIOR, MODELS, STATISTICAL ANALYSIS, *OIL-SURFACTANT-WATER SYSTEMS
1183 ENGLAND, COASTS, OIL SPILLS, SPILL CLEANUP, GOVERNMENT AGENCIES, *ELENI V
1334 " CONTINGENCY PLANNING, POLLUTION PREVENTION, SPILL CLEANUP, GOVERNMENT AGENCIES
1178 ENGLISH CHANNEL, TANKERS, SURVEILLANCE, SAFETY, *TRAFFIC CONTROL
1370 ENVIRONMENTAL DETERIORATION, ECOSYSTEMS, RECOVERY, RESOURCE MANAGEMENT, RESTORATION
1373 " CONTAMINATION, MEDITERRANEAN SEA, SHORELINES, SOURCES, TAR, POLLUTION CONTROL
1180 ENVIRONMENTAL EFFECTS, BIRDS, OIL SPILLS, UK, TANKERS, OIL TRANSFER, *CHRISTOS BITAS SPILL, *SALVAGE OPERATIONS
1184 " CONTAMINATION, SPILL CLEANUP, OIL DISCHARGES, LEAKAGE, SHIPS, IRELAND
1191 " BAYS, SPILL CLEANUP, PORTS , INTERTIDAL ZONE, FLORIDA, USCG, *PORT SUTTON SPILL
1201 " COASTS, BIRDS, TAR, SWEDEN
1263 " DISPERSANTS, BEACH CLEANUP, ANALYTICAL TECHNIQUES, OIL SLICKS, TOXICITY, *LICENSING, SPILL CLEANUP, UK
1285 " REFINERIES, WASTEWATERS, *PROCESSING, *CATALOG
1296 " DISPOSAL , DESIGN-ENGINEERING, WASTE OIL, VEGETATION, SOIL, *LAND APPLICATION
1302 " DISPOSAL , DECOMPOSITION, BIODEGRADATION, BIBLIOGRAPHIES, SOILS, *CASE STUDIES, *OIL SPILL DEBRIS
1358 " BIRDS, BIOLOGICAL EFFECTS, OIL SPILLS, FISH
1365 " ECONOMICS, ARCTIC, SPILL CLEANUP, SOCIAL EFFECTS, *REMOTE REGIONS
1374 " BIOLOGICAL EFFECTS, OIL SPILLS, OFFSHORE EXPLORATION, OFFSHORE DEVELOPMENT, WASTEWATERS, UN, *GESAMP
1376 " OIL SPILLS, OCEANS, *BOOK
1381 " CHEMICAL ANALYSIS, BLOWOUTS, HYDROCARBONS , SEDIMENTS, TEXAS, GULF OF MEXICO
1385 " PRODUCTION , INDUSTRIES, GUIDELINES, *REVIEW, *WETLANDS
1389 " EIS, ATLANTIC COAST, OCS, OIL-GAS LEASING, SOCIOECONOMIC EFFECTS
1390 " EIS, ATLANTIC COAST, OCS, OFFSHORE DEVELOPMENT, OIL-GAS LEASING, ONSHORE IMPACTS
1394 " EIS, CRUDE OIL, STORAGE, *STRATEGIC PETROLEUM RESERVE
1395 " EIS, CRUDE OIL, STORAGE, LOUISIANA, *STRATEGIC PETROLEUM RESERVE
1396 " EIS, CRUDE OIL, STORAGE, LOUISIANA, *STRATEGIC PETROLEUM RESERVE
1397 " EIS, CRUDE OIL, STORAGE, LOUISIANA, *STRATEGIC PETROLEUM RESERVE
1399 " EIS, STORAGE, *STRATEGIC PETROLEUM RESERVE
1401 " EIS, STORAGE, *STRATEGIC PETROLEUM RESERVE
1403 " EIS, STORAGE, OIL SPILLS, *RISK ANALYSIS, *STRATEGIC PETROLEUM RESERVE
1417 " BENTHOS, BASELINE STUDIES, HABITATS, MARINE ORGANISMS, OIL TRANSPORT, OIL TRANSFER, PUGET SOUND
1429 " CONTAMINATION, LEGISLATION, OCEANS, MONITORING, NOAA, US, *RESEARCH
1441 " BIBLIOGRAPHIES, OFFSHORE DRILLING, OIL WELLS, LEGISLATION, EQUIPMENT
1442 " DESIGN-ENGINEERING, BIBLIOGRAPHIES, OFFSHORE DEVELOPMENT
1449 " DEVELOPMENT , BIOLOGICAL EFFECTS, *ENCYCLOPEDIA
1454 " FUELS , *REVIEW
1455 " FUELS , *REVIEW
R181 " CHRONIC EFFECTS, CHEMICAL ANALYSIS, ARGO MERCHANT SPILL, SAMPLING
R182 " CHEMICAL ANALYSIS, GASOLINE, *BARGE 250 SPILL, RHODE ISLAND, SAMPLING
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1384 " DRILLING , BIOLOGICAL EFFECTS, OFFSHORE DEVELOPMENT, OCEANS, SOURCES, REGULATIONS, MONITORING
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1338 ENVIRONMENTAL PROTECTION, ECONOMICS, POLLUTION CONTROL, MEDITERRANEAN SEA, *TREATY, *STANDARDS
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1431 " CONTINGENCY PLANNING, LEGISLATION, HEALTH HAZARDS, POLLUTION CONTROL, OCEANS, FRESHWATER, US
1433 " OCS, OFFSHORE DEVELOPMENT, GOVERNMENT AGENCIES, REGULATIONS, SAFETY, USGS
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1221 " ANALYTICAL TECHNIQUES, REMOTE SENSING, SOURCE IDENTIFICATION, OIL SLICKS, MONITORING, POLLUTION CONTROL, *LASER FLUORESCENCE
1283 " CONTAMINANTS, API, ANALYTICAL TECHNIQUES, WASTEWATERS, REFINERIES, SAMPLING
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1212 " MONITORING, PRODUCT INFORMATION, HYDROCARBONS , *INFRARED SENSOR
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1248 " BOOMS, SPILL CONTAINMENT, PLATFORMS, PATENT
1249 " BOOMS, SPILL CONTAINMENT, POLLUTION CONTROL, PATENT
1250 " CANADA, BOOMS, SPILL CONTAINMENT, POLLUTION CONTROL, PRODUCT INFORMATION, US, *FIELD TRIALS
1251 " DESIGN-ENGINEERING, PRODUCT INFORMATION, SKIMMERS, SPILL REMOVAL, *SSACV OIL SKIMMER , PATENT
1252 " DESIGN-ENGINEERING, DEEPWATER PORTS, SKIMMERS, PRODUCT INFORMATION, IRELAND, *BAY SKIMMER
1253 " DESIGN-ENGINEERING, SKIMMERS, PRODUCT INFORMATION, SPILL CLEANUP, IRELAND, *BANTRY BAY
1254 " DESIGN-ENGINEERING, SPILL REMOVAL, SKIMMERS, PRODUCT INFORMATION
1255 " DESIGN-ENGINEERING, POLLUTION PREVENTION, SPILL CONTAINMENT, SPILL REMOVAL, PRODUCT INFORMATION
1256 " DESIGN-ENGINEERING, SKIMMERS, SPILL REMOVAL, PRODUCT INFORMATION, *DYNAMIC OIL SKIMMER
1257 " EKOFISK BLOWOUT, DESIGN-ENGINEERING, SPILL CLEANUP, PRODUCT INFORMATION, SKIMMERS
1258 " DESIGN-ENGINEERING, SPILL REMOVAL, PATENT
1261 " DESIGN-ENGINEERING, SPILL REMOVAL, SKIMMERS, OIL-WATER SEPARATION, PATENT, *VACUUMING
1262 " DESIGN-ENGINEERING, SPILL REMOVAL, SKIMMERS, OIL-WATER SEPARATION, PATENT
1263 " DESIGN-ENGINEERING, HYDROCARBONS , SPILL CLEANUP, SKIMMERS, PATENT
1264 " SPILL REMOVAL, OIL-WATER SEPARATION, SKIMMERS, PATENT
1265 " DISPERSION, DESIGN-ENGINEERING, SURFACTANTS, OIL SPILLS, PATENT
1266 " SPILL CLEANUP, *ULTRASONIC TRANSDUCER, PATENT
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1309 " OIL-WATER SEPARATION, SPILL CLEANUP, PATENT
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1328 " DISTILLATION, WASTE OIL, RECLAMATION, REUSE, EVAPORATION, PATENT
1329 " RECLAMATION, SPILL REMOVAL, SKIMMERS, PRODUCT INFORMATION
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1343 " DETECTION, POLLUTION CONTROL, FRANCE, OIL-WATER SEPARATION, SKIMMERS, SORBENTS,
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1436 " COMPENSATION, POLLUTION CONTROL, INTERNATIONAL CONVENTIONS, INFORMATION SYSTEMS,
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1328 " EQUIPMENT, DISTILLATION, WASTE OIL, RECLAMATION, REUSE, PATENT
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1412 " DISPERSION, BOOK REVIEW, BIODEGRADATION, HYDROCARBONS , OIL SPILLS, OIL SLICKS
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1363 " BIOLOGICAL EFFECTS, ATLANTIC OCEAN, PLANKTON, OFFSHORE DEVELOPMENT, HYDROCARBONS
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1192 " EPA, SPILL CLEANUP, PORTS , SOURCE IDENTIFICATION, USCG, *PORT SUTTON SPILL, *CLEANUP COSTS
1193 " SOURCE IDENTIFICATION, LAW ENFORCEMENT, USCG, LIABILITY, *PORT SUTTON SPILL, *CLEANUP COSTS
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1292 " EMULSIFIERS, WASTEWATER TREATMENT, *COAGULATION, OIL-WATER SEPARATION
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1430 " ENVIRONMENTAL PROTECTION, CONTINGENCY PLANNING, LEGISLATION, HEALTH HAZARDS, POLLUTION CONTROL, OCEANS, US
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1416 " BIODEGRADATION, BACTERIA, OXIDATION, *DESULFOVIBRIO DESULFURICANS, *WADDEN SEA
1418 " CHROMATOGRAPHY, BIODEGRADATION, TAR, NATURAL SEEPAGE, *HYPERSALINE ENVIRONMENTS

1421 HYDROCARBONS , FATE, BIOLOGICAL EFFECTS, BENTHOS, ATLANTIC COAST, UPTAKE, SEDIMENTATION, RHODE ISLAND, MOLLUSKS
1422 " LAKES , SOURCES, RIVERS, SEDIMENTATION, WASHINGTON, *RUNOFF
R151 " AROMATIC HYDROCARBONS, MONITORING, SEAWATER, SEDIMENTS, MOLLUSKS, SAMPLING
R153 " CHEMICAL ANALYSIS, PLANKTON, NEUSTON, SEDIMENTS, SAMPLING, PUGET SOUND, WASHINGTON
R158 " BIODEGRADATION, SURFACTANTS, WASTEWATER TREATMENT, SPILL CLEANUP, *SOLUBILIZATION
R159 " ABSORPTION, SPILL CLEANUP, *STARCH POLYMERS
R168 " ESTUARIES, DELAWARE BAY, BIOASSAY, PETROLEUM PRODUCTS, MOLLUSKS, TOXICITY, *OYSTER INDUSTRY
R171 " HEALTH HAZARDS, FISH, BIRDS, TOXICITY, *ALTERED MEMBRANE
R175 " FISH, CONTAMINANTS, SUBLETHAL EFFECTS, METABOLISM, *BIOCHEMICAL EFFECTS
R177 " CRUDE OIL, BIRDS, BIOLOGICAL EFFECTS, TOXICITY, REPRODUCTION, SUBLETHAL EFFECTS, UPTAKE, *EGGS
R178 " FISH, CRUSTACEANS, BIOLOGICAL EFFECTS, WSF, SUBLETHAL EFFECTS, MOLLUSKS, TOXICITY, *DEFENSE MECHANISMS
R179 " FATE, ECOSYSTEMS, CHRONIC EFFECTS, BIOASSAY, ANALYTICAL TECHNIQUES, BIOINDICATORS, INTERTIDAL ZONE
R180 " FOOD WEB, CONTAMINANTS, CALIFORNIA, WASTEWATERS, MARINE ORGANISMS, *POLLUTANT FLOW
R190 " GULF OF MEXICO, BASELINE STUDIES, ATLANTIC COAST, OCS, SEDIMENTS, *GEOCHEMISTRY
R191 " BIODEGRADATION, MICROORGANISMS, *INTRACELLULAR KINETICS
R192 " BIODEGRADATION, MICROORGANISMS, *PLASMID INTERACTION, *EVOLUTION
R194 " FATE, CHROMATOGRAPHY, BERMUDA, SEDIMENTATION, SPECTROMETRY
R195 " FATE, ALASKA , SOURCES, SEDIMENTATION, OCS, *NORTON SOUND
1274 ICE, FUEL OIL, FATE, BUZZARDS BAY, BOUCHARD 65 SPILL, BEHAVIOR, SPILL CLEANUP
1427 " FATE, ESTUARIES, DISPERSANTS, BEHAVIOR, ARCTIC, INCINERATION, SPILL CLEANUP, *EXPERIMENTAL OIL SPILLS
R200 " DRIFT, BEAUFORT SEA, OIL SPILLS, MOVEMENT, MODELS
1182 ILLINOIS, EPA, SPILL CLEANUP, PIPELINES, OIL SPILLS, RIVERS
1332 IMCO, DISPERSANTS, BOOMS, PERSONNEL TRAINING, MANUALS, SKIMMERS, SINKING AGENTS, SORBENTS, SPILL CLEANUP
1431 " GUIDELINES, CRUDE OIL WASHING, SAFETY, TANKERS, POLLUTION PREVENTION, SEGREGATED BALLAST, *INERT GAS SYSTEMS, SURVEILLANCE
1434 " INTERNATIONAL CONVENTIONS, POLLUTION PREVENTION, SHIPS, OIL DISCHARGES, *AMENDMENTS
1435 " REGULATIONS, INTERNATIONAL CONVENTIONS, *MARINE POLLUTION CONVENTION
1436 " INTERNATIONAL CONVENTIONS, POLLUTION CONTROL, SHIPS, UN
1196 INCINERATION, PIPELINES, OIL SPILLS, INLAND, SPILL CONTAINMENT, *UTAH
1197 " SPILL CLEANUP, PIPELINES, INLAND, *UTAH
1275 " OIL SLICKS, SPILL CLEANUP, *COMBUSTION, PATENT
1231 " SLUDGE , SHIPS, PRODUCT INFORMATION, POLLUTION PREVENTION, *EDCC/CITEX SYSTEM
1427 " ICE, FATE, ESTUARIES, DISPERSANTS, BEHAVIOR, ARCTIC, SPILL CLEANUP, *EXPERIMENTAL OIL SPILLS
1230 INDUSTRIES, ANALYTICAL TECHNIQUES, POLLUTION PREVENTION, WATER QUALITY
1294 " EMULSIONS, DISPOSAL , WASTE OIL, *LANDFILLS, *LEACHING, *PILOT STUDY
1377 " HYDROCARBONS , FRESHWATER, DETECTION, BIOLOGICAL EFFECTS, BIODEGRADATION, SOURCES, OCEANS, POLLUTION CONTROL, WASTEWATERS
1395 " GUIDELINES, ENVIRONMENTAL EFFECTS, PRODUCTION , *REVIEW, *WETLANDS
1423 " SAFETY, *RISK ANALYSIS, OFFSHORE DEVELOPMENT, STATISTICS
1440 " ECONOMICS, BIBLIOGRAPHIES, WASTEWATER TREATMENT, REFINERIES, PETROCHEMICALS, POLLUTION CONTROL
1443 " BIBLIOGRAPHIES, ALASKA , OFFSHORE DEVELOPMENT, OCS, ONSHORE IMPACTS, SOCIOECONOMIC EFFECTS, LEGISLATION
R162 " WASTEWATER TREATMENT, REFINING, *LAND APPLICATION
1198 INFORMATION SYSTEMS, TANKERS, SAFETY, STATISTICAL ANALYSIS, POLLUTION PREVENTION, *RISK ANALYSIS, *MARINE MANAGEMENT SYSTEMS, INC.
1218 " CONTAMINANTS, MONITORING, SOURCE IDENTIFICATION, *NATIONAL WATER DATA EXCHANGE
1436 " EUROPE, COMPENSATION, POLLUTION CONTROL, INTERNATIONAL CONVENTIONS, *EUROPEAN ECONOMIC COMMUNITY
1196 INLAND, INCINERATION, PIPELINES, OIL SPILLS, SPILL CONTAINMENT, *UTAH
1197 " INCINERATION, SPILL CLEANUP, PIPELINES, *UTAH
1336 " CONTINGENCY PLANNING, ALASKA , US, REGULATIONS, POLLUTION PREVENTION, POLLUTION CONTROL, OIL WELLS
1344 " GOVERNMENT AGENCIES, DRILLING , CONTINGENCY PLANNING, CANADA, BLOWOUT PREVENTION, REGULATIONS, POLLUTION PREVENTION
1337 INSURANCE, COMPENSATION, LIABILITY, SAFETY, OFFSHORE DEVELOPMENT
1382 " ECONOMIC EFFECTS, DEVELOPMENT , OIL INDUSTRY, TANKERS, OIL SPILLS, *CLAIMS
1343 INTERNATIONAL AGREEMENTS, POLLUTION PREVENTION, INTERNATIONAL CONVENTIONS, REGULATIONS, TANKERS, SAFETY
1343 INTERNATIONAL CONVENTIONS, INTERNATIONAL AGREEMENTS, POLLUTION PREVENTION, REGULATIONS, TANKERS, SAFETY
1434 " IMCO, POLLUTION PREVENTION, SHIPS, OIL DISCHARGES, *AMENDMENTS
1435 " IMCO, REGULATIONS, *MARINE POLLUTION CONVENTION
1436 " INFORMATION SYSTEMS, EUROPE, COMPENSATION, POLLUTION CONTROL, *EUROPEAN ECONOMIC COMMUNITY
1437 " FOREIGN GOVERNMENTS, RESOURCE MANAGEMENT, EUROPEAN ECONOMIC COMMUNITY, *LAW OF THE SEA, *JURISDICTION

1438 INTERNATIONAL CONVENTIONS, IMCO, POLLUTION CONTROL, SHIPS, UN
1191 INTERTIDAL ZONE, FLORIDA, ENVIRONMENTAL EFFECTS, BAYS, SPILL CLEANUP, PORTS , USCG, *PORT SUTTON SPILL
1362 " HABITATS, CHILE, BIOLOGICAL EFFECTS, MARINE ORGANISMS, OIL SPILLS, *NORTHERN BREEZE SPILL
1371 " FATE, CHRONIC EFFECTS, BOOK REVIEW, RECOVERY, RESTORATION, MARINE ORGANISMS, *PROCEEDINGS
2179 " HYDROCARBONS , FATE, ECOSYSTEMS, CHRONIC EFFECTS, BIOASSAY, ANALYTICAL TECHNIQUES, BIOINDICATORS
1353 INVERTEBRATES, CHILE, BIOLOGICAL EFFECTS, BEACHES, SHORELINES, OIL SPILLS, *NORTHERN BREEZE SPILL
1369 " FISH, ECONOMIC EFFECTS, CHILE, ALGAE, OIL SPILLS, *NORTHERN BREEZE SPILL
1184 IRELAND, ENVIRONMENTAL EFFECTS, CONTAMINATION, SPILL CLEANUP, OIL DISCHARGES, LEAKAGE, SHIPS
1252 " EQUIPMENT, DESIGN-ENGINEERING, DEEPWATER PORTS, SKIMMERS, PRODUCT INFORMATION, *BAY SKIMMER
1253 " EQUIPMENT, DESIGN-ENGINEERING, SKIMMERS, PRODUCT INFORMATION, SPILL CLEANUP, *BANTRY BAY
1268 " GOVERNMENT AGENCIES, DISPERSANTS, CONTINGENCY PLANNING, COASTS, BOOMS, SPILL CLEANUP, SKIMMERS, TANKERS
1195 ISRAEL, OIL SPILLS, POLLUTION CONTROL
1135 JAPAN, TANKERS, OIL SPILLS, LEAKAGE, SPILL CONTAINMENT, OIL TRANSFER, *RYUYO MARU SPILL
1453 " SAMPLING, MONITORING, PLANKTON, *HYDROLOGY, *SETO INLAND SEA
1203 LAKES , DOE, BLOWOUTS, SPILL CONTAINMENT, SPILL CLEANUP, OIL WELLS, LOUISIANA, USCG, *STRATEGIC PETROLEUM RESERVE
1204 " DOE, BLOWOUTS, SPILL CLEANUP, OIL WELLS, LOUISIANA, USCG, *STRATEGIC PETROLEUM RESERVE
1243 " SOURCE IDENTIFICATION, PAH, SEDIMENTS, GERMANY, *LAKE CONSTANCE
1422 " HYDROCARBONS , SOURCES, RIVERS, SEDIMENTATION, WASHINGTON, *ROBCPP
3154 " GC/MS, CHEMICAL ANALYSIS, *ATMOSPHERIC PETROLEUM RESIDUES, PAH
1193 LAW ENFORCEMENT, FLORIDA, SOURCE IDENTIFICATION, USCG, LIABILITY, *PORT SUTTON SPILL, *CLEANUP COSTS
1194 " FLORIDA, SOURCE IDENTIFICATION, USCG, SAMPLING, LIABILITY, TANKERS, *PORT SUTTON SPILL
1184 LEAKAGE, IRELAND, ENVIRONMENTAL EFFECTS, CONTAMINATION, SPILL CLEANUP, OIL DISCHARGES, SHIPS
1185 " JAPAN, TANKERS, OIL SPILLS, SPILL CONTAINMENT, OIL TRANSFER, *RYUYO MARU SPILL
1186 " PIPELINES, SPILL CONTAINMENT, LOUISIANA
1189 " DETECTION, SPILL CLEANUP, USCG, NEW YORK
1213 " HYDROCARBONS , EQUIPMENT, DETECTION, MONITORING, PATENT
[illegible]14 " DETECTION, MONITORING, PIPELINES, OIL TRANSFER, PATENT
1273 " DETECTION, PIPELINES, PATENT
1339 " STORAGE, POLLUTION PREVENTION, PATENT
1345 " EQUIPMENT, DETECTION, DESIGN-ENGINEERING, PIPELINES, PATENT
1341 LEGISLATION, ENVIRONMENTAL MANAGEMENT, POLLUTION CONTROL, MONITORING, MEDITERRANEAN SEA, UN, *UNEP
1388 " EXPLORATION , ECONOMIC EFFECTS, DISPOSAL , PRODUCTION , REGULATIONS, OIL SPILLS, *OVERVIEW
1429 " ENVIRONMENTAL EFFECTS, CONTAMINATION, OCEANS, MONITORING, NOAA, US, *RESEARCH
1433 " HEALTH HAZARDS, FRESHWATER, ENVIRONMENTAL PROTECTION, CONTINGENCY PLANNING, POLLUTION CONTROL, OCEANS, US
1439 " BIBLIOGRAPHIES, OCEANS, OFFSHORE DRILLING, POLLUTION CONTROL
1441 " EQUIPMENT, ENVIRONMENTAL EFFECTS, BIBLIOGRAPHIES, OFFSHORE DRILLING, OIL WELLS
1443 " INDUSTRIES, BIBLIOGRAPHIES, ALASKA , OFFSHORE DEVELOPMENT, OCS, ONSHORE IMPACTS, SOCIOECONOMIC EFFECTS
1447 " ECONOMICS, BIBLIOGRAPHIES, OCEANS, UN, *LAW OF THE SEA CONFERENCE
1188 LIABILITY, AMOCO CADIZ SPILL, *INQUEST
1193 " LAW ENFORCEMENT, FLORIDA, SOURCE IDENTIFICATION, USCG, *PORT SUTTON SPILL, *CLEANUP COSTS
1194 " LAW ENFORCEMENT, FLORIDA, SOURCE IDENTIFICATION, USCG, SAMPLING, TANKERS, *PORT SUTTON SPILL
1337 " INSURANCE, COMPENSATION, SAFETY, OFFSHORE DEVELOPMENT
1186 LOUISIANA, LEAKAGE, PIPELINES, SPILL CONTAINMENT
1230 " OIL SPILLS, TANKERS, USCG, SPILL CLEANUP, MISSISSIPPI RIVER, *IRENE S. LEMOS SPILL
1203 " LAKES , DOE, BLOWOUTS, SPILL CONTAINMENT, SPILL CLEANUP, OIL WELLS, USCG, *STRATEGIC PETROLEUM RESERVE
1204 " LAKES , DOE, BLOWOUTS, SPILL CLEANUP, OIL WELLS, USCG, *STRATEGIC PETROLEUM RESERVE
1279 " FEA, CRUDE OIL, STORAGE, OIL TRANSFER, PIPELINES, *STRATEGIC PETROLEUM RESERVE
1395 " ENVIRONMENTAL EFFECTS, EIS, CRUDE OIL, STORAGE, *STRATEGIC PETROLEUM RESERVE
1396 " ENVIRONMENTAL EFFECTS, EIS, CRUDE OIL, STORAGE, *STRATEGIC PETROLEUM RESERVE
1397 " ENVIRONMENTAL EFFECTS, EIS, CRUDE OIL, STORAGE, *STRATEGIC PETROLEUM RESERVE
8185 " FISH, ECOSYSTEMS, COASTS, ATLANTIC COAST, *PACIFIC NORTHWEST, MAINE, WILDLIFE, OFFSHORE DEVELOPMENT
1333 LUBRICATING OIL, WASTE OIL, RECLAMATION, PATENT, *REGENERATION, *VACUUM STRIPPING
1331 " DISTILLATION. RECLAMATION, WASTE OIL, SOLVENTS, PATENT, *VACUUM STRIPPING

8167 MAINE, FUEL OIL, BIOLOGICAL EFFECTS, MOLLUSKS, *TUMORS, *MYA ARENARIA
8185 " LOUISIANA, FISH, ECOSYSTEMS, COASTS, ATLANTIC COAST, *PACIFIC NORTHWEST, WILDLIFE, OFFSHORE DEVELOPMENT
1332 MANUALS, IMCO, DISPERSANTS, BOOMS, PERSONNEL TRAINING, SKIMMERS, SINKING AGENTS, SORBENTS, SPILL CLEANUP
1213 MARINE ORGANISMS, DETECTION, BIBLIOGRAPHIES, MONITORING, BIOINDICATORS, MICROORGANISMS
1362 " INTERTIDAL ZONE, HABITATS, CHILE, BIOLOGICAL EFFECTS, OIL SPILLS, *NORTHERN BREEZE SPILL
1371 " INTERTIDAL ZONE, FATE, CHRONIC EFFECTS, BOOK REVIEW, RECOVERY, RESTORATION, *PROCEEDINGS
1378 " HYDROCARBONS , BIOLOGICAL EFFECTS, PAH, SEDIMENTS, TAR, SOURCES, TANKERS, MEDITERRANEAN SEA
1407 " HABITATS, ENVIRONMENTAL EFFECTS, BENTHOS, BASELINE STUDIES, OIL TRANSPORT, OIL TRANSFER, PUGET SOUND
8161 " BIOASSAY, WASTEWATER TREATMENT, REFINERIES
8165 " FUEL OIL, BEHAVIOR, *HEAT, SUBLETHAL EFFECTS, *CHEMORECEPTION, MODELS
8166 " CRUDE OIL, WSF, PETROLEUM PRODUCTS, TOXICITY
8169 " FISH, BIOLOGICAL EFFECTS, BEHAVIOR, *CHEMORECEPTION, PACIFIC OCEAN
8173 " CRUDE OIL, CHEMICAL ANALYSIS, BIOASSAY, ALASKA , WSF, TOXICITY
8180 " HYDROCARBONS , FOOD WEB, CONTAMINANTS, CALIFORNIA, WASTEWATERS, *POLLUTANT FLOW
8174 MARSHES, FOOD WEB, FISHERIES, ECOSYSTEMS, COASTS, BENTHOS
1451 MASSACHUSETTS, FOSSIL FUELS, BUZZARDS BAY, AROMATIC HYDROCARBONS, SEDIMENTS, PAH, SOURCES, *COMBUSTION
1241 MEDITERRANEAN SEA, CONTAMINANTS, ANALYTICAL TECHNIQUES, SEAWATER, SURFACTANTS, SOURCE INDENTIFICATION, *ELECTROANALYSIS
1338 " ENVIRONMENTAL PROTECTION, ECONOMICS, POLLUTION CONTROL, *TREATY, *STANDARDS
1341 " LEGISLATION, ENVIRONMENTAL MANAGEMENT, POLLUTION CONTROL, MONITORING, UN, *UNEP
1373 " ENVIRONMENTAL DETERIORATION, CONTAMINATION, SHORELINES, SOURCES, TAR, POLLUTION CONTROL
1378 " MARINE ORGANISMS, HYDROCARBONS , BIOLOGICAL EFFECTS, PAH, SEDIMENTS, TAR, SOURCES, TANKERS
1351 METABOLISM, FISH, EMULSIONS, DISPERSANTS, CRUDE OIL, SUBLETHAL EFFECTS, TOXICITY, WEATHERING
1365 " HYDROCARBONS , CRUSTACEANS, BIOLOGICAL EFFECTS, BIOASSAY, AROMATIC HYDROCARBONS, TOXICITY, *ESTUARINE SHRIMP
8175 " HYDROCARBONS , FISH, CONTAMINANTS, SUBLETHAL EFFECTS, *BIOCHEMICAL EFFECTS
1423 METULA SPILL, FATE, ECOSYSTEMS, DISTRIBUTION, CONTAMINATION, BEHAVIOR, MOVEMENT, *COASTAL ENVIRONMENTS
1213 MICROORGANISMS, MARINE ORGANISMS, DETECTION, BIBLIOGRAPHIES, MONITORING, BIOINDICATORS
1222 " BIODEGRADATION, ANALYTICAL TECHNIQUES, SAMPLING, *ENUMERATION, *MOST PROBABLE NUMBER METHOD
1273 " DISPERSANTS, BIODEGRADATION, SPILL CLEANUP, PATENT
1406 " GUIDELINES, BIODEGRADATION, BASELINE STUDIES, ANALYTICAL TECHNIQUES, ALASKA , OCS, OFFSHORE DEVELOPMENT, NOAA
1410 " HYDROCARBONS , BIODEGRADATION, SPILL CLEANUP
1411 " EMULSIFICATION, BIODEGRADATION, BEHAVIOR, OIL SPILLS, OIL DISCHARGES, SOURCES, SPILL CLEANUP, *REVIEW
1413 " HYDROCARBONS , FUNGI, BIODEGRADATION, BACTERIA, YEASTS, OXIDATION, * REVIEW
1414 " BIODEGRADATION, SPILL CLEANUP, *FERTILIZER, *NITROGEN, *PHOSPHORUS
1415 " CHRONIC EFFECTS, BIODEGRADATION, ACUTE EFFECTS, OCS, OIL SPILLS, SAMPLING
1417 " DISTRIBUTION, BIODEGRADATION, BACTERIA, USSR, *VARNA BAY
8191 " HYDROCARBONS , BIODEGRADATION, *INTRACELLULAR KINETICS
8192 " HYDROCARBONS , BIODEGRADATION, *PLASMID INTERACTION, *EVOLUTION
1233 MISSISSIPPI RIVER, LOUISIANA, OIL SPILLS, TANKERS, USCG, SPILL CLEANUP, *IRENE S. LEMOS SPILL
1245 MODELS, FUEL OIL, DETECTION, SOURCE IDENTIFICATION, PETROLEUM PRODUCTS, SPECTROMETRY, STATISTICAL ANALYSIS
1295 " EUROPE, COST ANALYSIS, BIOLOGICAL TREATMENT, WASTEWATERS, PETROCHEMICALS
1424 " BOOMS, *DISPERSIVE OIL LOSSES, OIL SLICKS, *THEORETICAL RESEARCH
1425 " FATE, BEHAVIOR, OIL SPILLS
1426 " ESTUARIES, DISPERSION, CONTAMINANTS
1428 " FATE, DISTRIBUTION, BEHAVIOR, OIL SLICKS, SPREADING, *PREDICTION
8163 " COALESCENCE, OIL-WATER SEPARATION, *EVALUATIONS
8165 " MARINE ORGANISMS, FUEL OIL, BEHAVIOR, *HEAT, SUBLETHAL EFFECTS, *CHEMORECEPTION
8198 " EMULSIONS, BEHAVIOR, STATISTICAL ANALYSIS, *OIL-SURFACTANT-WATER SYSTEMS
8199 " DISTRIBUTION, ALASKA , *SPILL TRAJECTORY, OCS
8233 " ICE, DRIFT, BEAUFORT SEA, OIL SPILLS, *MOVEMENT
1239 MOLLUSKS, HYDROCARBONS , CHROMATOGRAPHY, BIOGENIC HYDROCARBONS, *CHITON
1421 " HYDROCARBONS , FATE, BIOLOGICAL EFFECTS, BENTHOS, ATLANTIC COAST, UPTAKE, SEDIMENTATION, RHODE ISLAND
8151 " HYDROCARBONS , AROMATIC HYDROCARBONS, MONITORING, SEAWATER, SEDIMENTS, SAMPLING
8167 " MAINE, FUEL OIL, BIOLOGICAL EFFECTS, *TUMORS, *MYA ARENARIA
8168 " HYDROCARBONS , ESTUARIES, DELAWARE BAY, BIOASSAY, PETROLEUM PRODUCTS, TOXICITY, *OYSTER INDUSTRY

2176 " HYDROCARBONS , FISH, CRUSTACEANS, BIOLOGICAL EFFECTS, WSF, SUBLETHAL EFFECTS, TOXICITY, *DEFENSE MECHANISMS
2186 MOLLUSKS, ECOSYSTEMS, CHRONIC EFFECTS, BIOLOGICAL EFFECTS, BASELINE STUDIES, REFINERIES, OIL TRANSFER, OIL TERMINALS, *PACIFIC NORTHWEST
1205 MONITORING, EQUIPMENT, DETECTION, BALLAST , ANALYTICAL TECHNIQUES, TANKERS, OIL DISCHARGES, PATENT
1206 " EQUIPMENT, DETECTION, WASTEWATERS, OIL DISCHARGES, PRODUCT INFORMATION
1207 " HYDROCARBONS , EQUIPMENT, DETECTION, PRODUCT INFORMATION, *FLUOROMETRY, *PETRO-TRACT SYSTEM
1208 " EQUIPMENT, DISPERSION, PRODUCT INFORMATION, *OIL-IN-WATER
1209 " EQUIPMENT, CHROMATOGRAPHY, AROMATIC HYDROCARBONS, PRODUCT INFORMATION, *BENZENE
1210 " MICROORGANISMS, MARINE ORGANISMS, DETECTION, BIBLIOGRAPHIES, BIOINDICATORS
1211 " HYDROCARBONS , FRESHWATER, FISH, BASELINE STUDIES, BACTERIA, ANALYTICAL TECHNIQUES, BIOINDICATORS, OCEANS
1212 " HYDROCARBONS , EQUIPMENT, PRODUCT INFORMATION, *INFRARED SENSOR
1213 " LEAKAGE, HYDROCARBONS , EQUIPMENT, DETECTION, PATENT
1214 " LEAKAGE, DETECTION, PIPELINES, OIL TRANSFER, PATENT
1215 " DETECTION, CONTAMINANTS, OCEANS, SORBENTS
1216 " EQUIPMENT, *AUTOMATION, SAMPLING, *DATA PROCESSING
1217 " EQUIPMENT, ANALYTICAL TECHNIQUES, WASTEWATERS, REFINERIES, PRODUCT INFORMATION, *PHOTOMETRIC ANALYZER
1218 " INFORMATION SYSTEMS, CONTAMINANTS, SOURCE IDENTIFICATION, *NATIONAL WATER DATA EXCHANGE
1219 " DESIGN-ENGINEERING, WASTEWATERS, SLUDGE , *LASERS, *OIL FILM, PATENT
1221 " EPA, ANALYTICAL TECHNIQUES, REMOTE SENSING, SOURCE IDENTIFICATION, OIL SLICKS, POLLUTION CONTROL, *LASER FLUORESCENCE
1335 " CONTINGENCY PLANNING, POLLUTION CONTROL, *PERSIAN GULF, *ACTION PLAN
1341 " MEDITERRANEAN SEA, LEGISLATION, ENVIRONMENTAL MANAGEMENT, POLLUTION CONTROL, UN, *UNEP
1346 " FOREIGN GOVERNMENTS, EUROPE, POLLUTION CONTROL, SURVEILLANCE, UK
1372 " ENVIRONMENTAL PROTECTION, BIOLOGICAL EFFECTS, POLLUTION PREVENTION, SHIPS, UN, *CONFERENCE, *GESAMP
1384 " ENVIRONMENTAL MANAGEMENT, DRILLING , BIOLOGICAL EFFECTS, OFFSHORE DEVELOPMENT, OCEANS, SOURCES, REGULATIONS
1429 " LEGISLATION, ENVIRONMENTAL EFFECTS, CONTAMINATION, OCEANS, NOAA, US, *RESEARCH
1444 " DETECTION, CHEMICAL ANALYSIS, BIBLIOGRAPHIES, ANALYTICAL TECHNIQUES, SAMPLING, OIL SPILLS, *INDUSTRIAL WASTES
1452 " REMOTE SENSING, POLLUTION PREVENTION
1453 " JAPAN, SAMPLING, PLANKTON, *HYDROLOGY, *SETO INLAND SEA
2151 " MOLLUSKS, HYDROCARBONS , AROMATIC HYDROCARBONS, SEAWATER, SEDIMENTS, SAMPLING
1356 MORTALITY, HABITATS, CONTAMINATION, BIRDS, ACUTE EFFECTS, SUBLETHAL EFFECTS, *WATERFOWL
1357 " HYDROCARBONS , FATE, CONTAMINATION, BIRDS, TOXICITY, SURFACTANTS, SOURCES, *REVIEW
1364 " BIRDS, *OILED BIRDS , *SUCCESSFUL REARING, *CAPTIVITY
1193 MOVEMENT, BEACHES, OIL SLICKS, SOURCES, *TRINIDAD
1420 " METULA SPILL, FATE, ECOSYSTEMS, DISTRIBUTION, CONTAMINATION, BEHAVIOR, *COASTAL ENVIRONMENTS
2233 " MODELS, ICE, DRIFT, BEAUFORT SEA, OIL SPILLS
1414 NATURAL SEEPAGE, HYDROCARBONS , CHROMATOGRAPHY, BIODEGRADATION, TAR, *HYPERSALINE ENVIRONMENTS
2189 " DEVELOPMENT , CALIFORNIA, BASELINE STUDIES, *GEOLOGIC HAZARDS, OCS, SANTA BARBARA CHANNEL, SEDIMENTS
2153 NEUSTON, HYDROCARBONS , CHEMICAL ANALYSIS, PLANKTON, SEDIMENTS, SAMPLING, PUGET SOUND, WASHINGTON
1137 NEW YORK, SPILL CLEANUP, SHIPS, RIVERS, USCG, *HYGRADE NO. 2 BARGE SPILL
1189 " LEAKAGE, DETECTION, SPILL CLEANUP, USCG
1433 " DEVELOPMENT , DEEPWATER PORTS, PORTS , OIL DISCHARGES, SAFETY
1436 NOAA, MICROORGANISMS, GUIDELINES, BIODEGRADATION, BASELINE STUDIES, ANALYTICAL TECHNIQUES, ALASKA , OCS, OFFSHORE DEVELOPMENT
1429 " MONITORING, LEGISLATION, ENVIRONMENTAL EFFECTS, CONTAMINATION, OCEANS, US, *RESEARCH
1383 NORTH SEA, ECONOMIC EFFECTS, OFFSHORE DEVELOPMENT, *RISK ANALYSIS, PLATFORMS, SAFETY, OIL INDUSTRY
1211 OCEANS, MONITORING, HYDROCARBONS , FRESHWATER, FISH, BASELINE STUDIES, BACTERIA, ANALYTICAL TECHNIQUES, BIOINDICATORS
1215 " MONITORING, DETECTION, CONTAMINANTS, SORBENTS
1376 " ENVIRONMENTAL EFFECTS, OIL SPILLS, *BOOK
1377 " INDUSTRIES, HYDROCARBONS , FRESHWATER, DETECTION, BIOLOGICAL EFFECTS, BIODEGRADATION, SOURCES, POLLUTION CONTROL, WASTEWATERS
1379 " FOOD WEB, CRUDE OIL, BIOLOGICAL EFFECTS, SOURCES, TOXICITY, PETROLEUM PRODUCTS, PHYTOPLANKTON, *NEKTON
1384 " MONITORING, ENVIRONMENTAL MANAGEMENT, DRILLING , BIOLOGICAL EFFECTS, OFFSHORE DEVELOPMENT, SOURCES, REGULATIONS
1429 " NOAA, MONITORING, LEGISLATION, ENVIRONMENTAL EFFECTS, CONTAMINATION, US, *RESEARCH
1430 " LEGISLATION, HEALTH HAZARDS, FRESHWATER, ENVIRONMENTAL PROTECTION, CONTINGENCY PLANNING, POLLUTION CONTROL, US

1439 OCEANS, LEGISLATION, BIBLIOGRAPHIES, OFFSHORE DRILLING, POLLUTION CONTROL
1447 " LEGISLATION, ECONOMICS, BIBLIOGRAPHIES, UN, *LAW OF THE SEA CONFERENCE
R196 " GC/MS, FATE, DISTRIBUTION, BIOGENIC HYDROCARBONS, PETROCHEMICALS, SEDIMENTATION
1389 OCS, ENVIRONMENTAL EFFECTS, EIS, ATLANTIC COAST, OIL-GAS LEASING, SOCIOECONOMIC EFFECTS
1390 " ENVIRONMENTAL EFFECTS, EIS, ATLANTIC COAST, OFFSHORE DEVELOPMENT, OIL-GAS LEASING, ONSHORE IMPACTS
1391 " EIS, BLM, ALASKA , OIL-GAS LEASING, OFFSHORE DEVELOPMENT, *LOWER COOK INLET
1392 " EIS, BLM, ALASKA , OIL-GAS LEASING, OFFSHORE DEVELOPMENT, *LOWER COOK INLET
1393 " EIS, BLM, ALASKA , OIL-GAS LEASING, OFFSHORE DEVELOPMENT, *LOWER COOK INLET
1406 " NOAA, MICROORGANISMS, GUIDELINES, BIODEGRADATION, BASELINE STUDIES, ANALYTICAL TECHNIQUES, ALASKA , OFFSHORE DEVELOPMENT
1415 " MICROORGANISMS, CHRONIC EFFECTS, BIODEGRADATION, ACUTE EFFECTS, OIL SPILLS, SAMPLING
1433 " GOVERNMENT AGENCIES, ENVIRONMENTAL PROTECTION, OFFSHORE DEVELOPMENT, REGULATIONS, SAFETY, USGS
1443 " LEGISLATION, INDUSTRIES, BIBLIOGRAPHIES, ALASKA , OFFSHORE DEVELOPMENT, ONSHORE IMPACTS, SOCIOECONOMIC EFFECTS
R188 " GEORGES BANK, ENVIRONMENTAL EFFECTS, BASELINE STUDIES, OFFSHORE EXPLORATION, *RISK ANALYSIS
R189 " NATURAL SEEPAGE, DEVELOPMENT , CALIFORNIA, BASELINE STUDIES, *GEOLOGIC HAZARDS, SANTA BARBARA CHANNEL, SEDIMENTS
R190 " HYDROCARBONS , GULF OF MEXICO, BASELINE STUDIES, ATLANTIC COAST, SEDIMENTS, *GEOCHEMISTRY
R195 " HYDROCARBONS , FATE, ALASKA , SOURCES, SEDIMENTATION, *NORTON SOUND
R197 " BENTHOS, BASELINE STUDIES, ALASKA , SEDIMENTATION, SOURCE IDENTIFICATION, *ORGANIC DETRITUS, *PETROLEUM POLLUTANTS
R199 " MODELS, DISTRIBUTION, ALASKA , *SPILL TRAJECTORY
1337 OFFSHORE DEVELOPMENT, LIABILITY, INSURANCE, COMPENSATION, SAFETY
1363 " HYDROCARBONS , FATE, BIOLOGICAL EFFECTS, ATLANTIC OCEAN, PLANKTON
1374 " ENVIRONMENTAL EFFECTS, BIOLOGICAL EFFECTS, OIL SPILLS, OFFSHORE EXPLORATION, WASTEWATERS, UN, *GESAMP
1383 " NORTH SEA, ECONOMIC EFFECTS, *RISK ANALYSIS, PLATFORMS, SAFETY, OIL INDUSTRY
1384 " OCEANS, MONITORING, ENVIRONMENTAL MANAGEMENT, DRILLING , BIOLOGICAL EFFECTS, SOURCES, REGULATIONS
1386 " DESIGN-ENGINEERING, PLATFORMS, SAFETY, POLLUTION CONTROL, REGULATIONS
1390 " OCS, ENVIRONMENTAL EFFECTS, EIS, ATLANTIC COAST, OIL-GAS LEASING, ONSHORE IMPACTS
1391 " OCS, EIS, BLM, ALASKA , OIL-GAS LEASING, *LOWER COOK INLET
1392 " OCS, EIS, BLM, ALASKA , OIL-GAS LEASING, *LOWER COOK INLET
1393 " OCS, EIS, BLM, ALASKA , OIL-GAS LEASING, *LOWER COOK INLET
1406 " OCS, NOAA, MICROORGANISMS, GUIDELINES, BIODEGRADATION, BASELINE STUDIES, ANALYTICAL TECHNIQUES, ALASKA
1423 " INDUSTRIES, SAFETY, *RISK ANALYSIS, STATISTICS
1433 " OCS, GOVERNMENT AGENCIES, ENVIRONMENTAL PROTECTION, REGULATIONS, SAFETY, USGS
1442 " ENVIRONMENTAL EFFECTS, DESIGN-ENGINEERING, BIBLIOGRAPHIES
1443 " OCS, LEGISLATION, INDUSTRIES, BIBLIOGRAPHIES, ALASKA , ONSHORE IMPACTS, SOCIOECONOMIC EFFECTS
R185 " MAINE, LOUISIANA, FISH, ECOSYSTEMS, COASTS, ATLANTIC COAST, *PACIFIC NORTHWEST, WILDLIFE
R187 " GEORGES BANK, FISHERIES, EIS, ECONOMIC EFFECTS, BIOLOGICAL EFFECTS
1228 OFFSHORE DRILLING, HYDROCARBONS , CONTAMINATION, BIOGENIC HYDROCARBONS, ATLANTIC COAST, SEDIMENTS, SOURCES, *NOVA SCOTIA
1439 " OCEANS, LEGISLATION, BIBLIOGRAPHIES, POLLUTION CONTROL
1441 " LEGISLATION, EQUIPMENT, ENVIRONMENTAL EFFECTS, BIBLIOGRAPHIES, OIL WELLS
1374 OFFSHORE EXPLORATION, OFFSHORE DEVELOPMENT, ENVIRONMENTAL EFFECTS, BIOLOGICAL EFFECTS, OIL SPILLS, WASTEWATERS, UN, *GESAMP
R188 " OCS, GEORGES BANK, ENVIRONMENTAL EFFECTS, BASELINE STUDIES, *RISK ANALYSIS
1184 OIL DISCHARGES, LEAKAGE, IRELAND, ENVIRONMENTAL EFFECTS, CONTAMINATION, SPILL CLEANUP, SHIPS
1205 " MONITORING, EQUIPMENT, DETECTION, BALLAST , ANALYTICAL TECHNIQUES, TANKERS, PATENT
1206 " MONITORING, EQUIPMENT, DETECTION, WASTEWATERS, PRODUCT INFORMATION
1271 " HYDROCARBONS , FRESHWATER, BIODEGRADATION, BALLAST , BACTERIA, SPILL CLEANUP, PRODUCT INFORMATION, SEAWATER
1277 " CRUDE OIL WASHING, BALLAST , TANKERS, OIL TERMINALS, OIL TRANSFER, POLLUTION PREVENTION
1343 " FRANCE, EQUIPMENT, DETECTION, POLLUTION CONTROL, OIL-WATER SEPARATION, SKIMMERS, SORBENTS, SINKING AGENTS, PRODUCT INFORMATION
1411 " MICROORGANISMS, EMULSIFICATION, BIODEGRADATION, BEHAVIOR, OIL SPILLS, SOURCES, SPILL CLEANUP, *REVIEW
1434 " INTERNATIONAL CONVENTIONS, IMCO, POLLUTION PREVENTION, SHIPS, *AMENDMENTS
1450 " NEW YORK, DEVELOPMENT , DEEPWATER PORTS, PORTS , SAFETY
R184 OIL FIELDS, ENVIRONMENTAL EFFECTS, DEVELOPMENT , BASELINE STUDIES, ANIMALS, ALASKA , *FOXES
1389 OIL-GAS LEASING, OCS, ENVIRONMENTAL EFFECTS, EIS, ATLANTIC COAST, SOCIOECONOMIC EFFECTS
1390 " OFFSHORE DEVELOPMENT, OCS, ENVIRONMENTAL EFFECTS, EIS, ATLANTIC COAST, ONSHORE IMPACTS

1391 OIL-GAS LEASING, OFFSHORE DEVELOPMENT, OCS, EIS, BLM, ALASKA , *LOWER COOK INLET
1392 " OFFSHORE DEVELOPMENT, OCS, EIS, BLM, ALASKA , *LOWER COOK INLET
1393 " OFFSHORE DEVELOPMENT, OCS, EIS, BLM, ALASKA , *LOWER COOK INLET
1333 OIL INDUSTRY, CONTINGENCY PLANNING, CANADA, PERSONNEL TRAINING, POLLUTION CONTROL, *FIELD EXERCISE
1375 " FISHERIES, ESTUARIES, ENVIRONMENTAL MANAGEMENT, WATER QUALITY, *PROCEEDINGS
1382 " INSURANCE, ECONOMIC EFFECTS, DEVELOPMENT , TANKERS, OIL SPILLS, *CLAIMS
1383 " OFFSHORE DEVELOPMENT, NORTH SEA, ECONOMIC EFFECTS, *RISK ANALYSIS, PLATFORMS, SAFETY
1380 OIL SHALE, GROUNDWATER, CONTAMINATION, *LEACHING
1176 OIL SLICKS, DISPERSANTS, BEACH CLEANUP, SHORELINES, SPILL CLEANUP, UK, *AMLWCH SPILL
1177 " ESTUARIES, DISPERSANTS, COASTS, BIRDS, BIOLOGICAL EFFECTS, OIL TERMINALS, UK, *AMLWCH SPILL
1181 " OIL SPILLS, UK, TANKERS, SHORELINES, *CHRISTOS BITAS SPILL
1190 " MOVEMENT, BEACHES, SOURCES, *TRINIDAD
1221 " MONITORING, EPA, ANALYTICAL TECHNIQUES, REMOTE SENSING, SOURCE IDENTIFICATION, POLLUTION CONTROL, *LASER FLUORESCENCE
1260 " ENVIRONMENTAL EFFECTS, DISPERSANTS, BEACH CLEANUP, ANALYTICAL TECHNIQUES, TOXICITY, *LICENSING, SPILL CLEANUP, UK
1275 " INCINERATION, SPILL CLEANUP, *COMBUSTION, PATENT
1367 " FATE, DRIFT, SPREADING
1412 " HYDROCARBONS , EVAPORATION, DISPERSION, BOOK REVIEW, BIODEGRADATION, OIL SPILLS
1424 " MODELS, BOOMS, *DISPERSIVE OIL LOSSES, *THEORETICAL RESEARCH
1428 " MODELS, FATE, DISTRIBUTION, BEHAVIOR, SPREADING, *PREDICTION
1179 OIL SPILLS, DISPERSANTS, UK, TANKERS, OIL TRANSFER, *CHRISTOS BITAS SPILL
1180 " ENVIRONMENTAL EFFECTS, BIRDS, UK, TANKERS, OIL TRANSFER, *CHRISTOS BITAS SPILL, *SALVAGE OPERATIONS
1181 " OIL SLICKS, UK, TANKERS, SHORELINES, *CHRISTOS BITAS SPILL
1182 " ILLINOIS, EPA, SPILL CLEANUP, PIPELINES, RIVERS
1183 " GOVERNMENT AGENCIES, ENGLAND, COASTS, SPILL CLEANUP, *ELENI V
1185 " LEAKAGE, JAPAN, TANKERS, SPILL CONTAINMENT, OIL TRANSFER, *RYOYO MARU SPILL
1195 " ISRAEL, POLLUTION CONTROL
1196 " INLAND, INCINERATION, PIPELINES, SPILL CONTAINMENT, *UTAH
1200 " MISSISSIPPI RIVER, LOUISIANA, TANKERS, USCG, SPILL CLEANUP, *IRENE S. LEMOS SPILL
1220 " FRANCE, EQUIPMENT, REMOTE SENSING, SURVEILLANCE
1225 " GC/MS, CRUDE OIL, ANALYTICAL TECHNIQUES, SOURCE IDENTIFICATION
1265 " EQUIPMENT, DISPERSION, DESIGN-ENGINEERING, SURFACTANTS, PATENT
1347 " HYDROCARBONS , ESTUARIES, TOXICITY, *PHOTO-OXIDATION
1353 " INVERTEBRATES, CHILE, BIOLOGICAL EFFECTS, BEACHES, SHORELINES, *NORTHERN BREEZE SPILL
1358 " FISH, ENVIRONMENTAL EFFECTS, BIRDS, BIOLOGICAL EFFECTS
1362 " MARINE ORGANISMS, INTERTIDAL ZONE, HABITATS, CHILE, BIOLOGICAL EFFECTS, *NORTHERN BREEZE SPILL
1369 " INVERTEBRATES, FISH, ECONOMIC EFFECTS, CHILE, ALGAE, *NORTHERN BREEZE SPILL
1374 " OFFSHORE EXPLORATION, OFFSHORE DEVELOPMENT, ENVIRONMENTAL EFFECTS, BIOLOGICAL EFFECTS, WASTEWATERS, UN, *GESAMP
1376 " OCEANS, ENVIRONMENTAL EFFECTS, *BOOK
1382 " OIL INDUSTRY, INSURANCE, ECONOMIC EFFECTS, DEVELOPMENT , TANKERS, *CLAIMS
1388 " LEGISLATION, EXPLORATION , ECONOMIC EFFECTS, DISPOSAL , PRODUCTION , REGULATIONS, *OVERVIEW
1398 " EIS, STORAGE, OIL TRANSPORT, *STRATEGIC PETROLEUM RESERVE
1400 " EIS, STORAGE, *BRINE SPILLS, *RISK ANALYSIS, *STRATEGIC PETROLEUM RESERVE
1402 " EIS, STORAGE, OIL TRANSPORT, OIL TERMINALS, *RISK ANALYSIS, *STRATEGIC PETROLEUM RESERVE
1403 " ENVIRONMENTAL EFFECTS, EIS, STORAGE, *RISK ANALYSIS, *STRATEGIC PETROLEUM RESERVE
1404 " FATE, ECOSYSTEMS, BASELINE STUDIES, ALASKA , SHORELINES, SEDIMENTATION, *VULNERABILITY INDEX, *LOWER COOK INLET
1405 " FATE, ECOSYSTEMS, BASELINE STUDIES, ALASKA , SHORELINES, SEDIMENTATION, *VULNERABILITY INDEX, *LOWER COOK INLET
1408 " GULF OF ALASKA, ECOSYSTEMS, BASELINE STUDIES, SHORELINES, SEDIMENTATION, *VULNERABILITY INDEX
1411 " OIL DISCHARGES, MICROORGANISMS, EMULSIFICATION, BIODEGRADATION, BEHAVIOR, SOURCES, SPILL CLEANUP, *REVIEW
1412 " OIL SLICKS, HYDROCARBONS , EVAPORATION, DISPERSION, BOOK REVIEW, BIODEGRADATION
1415 " OCS, MICROORGANISMS, CHRONIC EFFECTS, BIODEGRADATION, ACUTE EFFECTS, SAMPLING
1425 " MODELS, FATE, BEHAVIOR
1444 " MONITORING, DETECTION, CHEMICAL ANALYSIS, BIBLIOGRAPHIES, ANALYTICAL TECHNIQUES, SAMPLING, *INDUSTRIAL WASTES
1445 " DETECTION, CHEMICAL ANALYSIS, BIBLIOGRAPHIES, ANALYTICAL TECHNIQUES, SAMPLING, REMOTE SENSING, *INDUSTRIAL WASTES
R164 " CONTINGENCY PLANNING, US, *RESEARCH FUNDS
R183 " FRANCE
R200 " MOVEMENT, MODELS, ICE, DRIFT, BEAUFORT SEA
1175 OIL TERMINALS, OIL TRANSFER, TANKERS, SPILL CLEANUP, UK, *AMLWCH SPILL

1177 " OIL SLICKS, ESTUARIES, DISPERSANTS, COASTS, BIRDS, BIOLOGICAL EFFECTS, UK, *AMLWCH SPILL
1277 OIL TERMINALS, OIL DISCHARGES, CRUDE OIL WASHING, BALLAST , TANKERS, OIL TRANSFER, POLLUTION PREVENTION
1402 " OIL SPILLS, EIS, STORAGE, OIL TRANSPORT, *RISK ANALYSIS, *STRATEGIC PETROLEUM RESERVE
3186 " MOLLUSKS, ECOSYSTEMS, CHRONIC EFFECTS, BIOLOGICAL EFFECTS, BASELINE STUDIES, REFINERIES, OIL TRANSFER, *PACIFIC NORTHWEST
1175 OIL TRANSFER, OIL TERMINALS, TANKERS, SPILL CLEANUP, UK, *AMLWCH SPILL
1179 " OIL SPILLS, DISPERSANTS, UK, TANKERS, *CHRISTOS BITAS SPILL
1180 " OIL SPILLS, ENVIRONMENTAL EFFECTS, BIRDS, UK, TANKERS, *CHRISTOS BITAS SPILL, *SALVAGE OPERATIONS
1185 " OIL SPILLS, LEAKAGE, JAPAN, TANKERS, SPILL CONTAINMENT, *RYUYO MARU SPILL
1214 " MONITORING, LEAKAGE, DETECTION, PIPELINES, PATENT
1277 " OIL TERMINALS, OIL DISCHARGES, CRUDE OIL WASHING, BALLAST , TANKERS, POLLUTION PREVENTION
1279 " LOUISIANA, FEA, CRUDE OIL, STORAGE, PIPELINES, *STRATEGIC PETROLEUM RESERVE
1407 " MARINE ORGANISMS, HABITATS, ENVIRONMENTAL EFFECTS, BENTHOS, BASELINE STUDIES, OIL TRANSPORT, PUGET SOUND
2186 " OIL TERMINALS, MOLLUSKS, ECOSYSTEMS, CHRONIC EFFECTS, BIOLOGICAL EFFECTS, BASELINE STUDIES, REFINERIES, *PACIFIC NORTHWEST
1398 OIL TRANSPORT, OIL SPILLS, EIS, STORAGE, *STRATEGIC PETROLEUM RESERVE
1402 " OIL TERMINALS, OIL SPILLS, EIS, STORAGE, *RISK ANALYSIS, *STRATEGIC PETROLEUM RESERVE
1407 " OIL TRANSFER, MARINE ORGANISMS, HABITATS, ENVIRONMENTAL EFFECTS, BENTHOS, BASELINE STUDIES, PUGET SOUND
1261 OIL-WATER SEPARATION, EQUIPMENT, DESIGN-ENGINEERING, SPILL REMOVAL, SKIMMERS, PATENT, *VACUUMING
1262 " EQUIPMENT, DESIGN-ENGINEERING, SPILL REMOVAL, SKIMMERS, PATENT
1264 " EQUIPMENT, SPILL REMOVAL, SKIMMERS, PATENT
1282 " FLOTATION, WASTEWATER TREATMENT, PRODUCT INFORMATION, *ASPHALT PLANT, *OHIO RIVER
1284 " WASTEWATER TREATMENT, PATENT, *REVERSE OSMOSIS
1291 " EMULSIONS, BILGES, USN, WASTEWATER TREATMENT, *DEMULSIFICATION
1292 " FLOTATION, EMULSIFIERS, WASTEWATER TREATMENT, *COAGULATION
1297 " ADSORPTION, WASTEWATER TREATMENT, SCREENS, PATENT, *SORBENT FIBERS
1298 " ADSORPTION, WASTEWATER TREATMENT, SORBENTS, PATENT, *SORBENT FIBERS
1303 " ADSORPTION, WASTEWATER TREATMENT, SCREENS, PATENT, *SORBENT FIBERS
1304 " WASTEWATER TREATMENT, *PURIFICATION
1305 " HYDROCARBONS , *PURIFICATION AGENT, PATENT
1306 " EQUIPMENT, PATENT, *PACKED BEDS
1307 " EQUIPMENT, *DISPERSIONS, PATENT
1308 " EQUIPMENT, DESIGN-ENGINEERING, FILTRATION, PATENT
1309 " EQUIPMENT, SPILL CLEANUP, PATENT
1310 " EMULSIONS, COALESCENCE, PATENT, *SILICONE-COATED FIBERS
1311 " ADSORPTION, SORBENTS, PATENT, *KAPOK FIBERS
1312 " EQUIPMENT, EMULSIFIERS, SOLVENTS, PATENT
1313 " EQUIPMENT, DESIGN-ENGINEERING, WASTEWATER TREATMENT, PATENT
1314 " EQUIPMENT, PRODUCT INFORMATION
1315 " HYDROCARBONS , ADSORPTION, SEAWATER, SEDIMENTATION
1316 " EQUIPMENT, DESIGN-ENGINEERING, COALESCENCE, BALLAST , USN
1317 " HYDROCARBONS , BIOASSAY, FILTRATION, WASTEWATERS, *BIOASSAY EFFLUENT, *SORBENT FIBERS
1318 " EMULSIONS, ADSORPTION, PATENT, *SORBENT POWDER
1319 " FUEL OIL, WASTEWATER TREATMENT, PATENT, *SORBENT FIBERS
1320 " ABSORPTION, SORBENTS, PATENT, *PLANT FIBER MATS
1321 " EMULSIONS, CRUDE OIL, PATENT, *DEMULSIFIERS
1322 " ABSORPTION, SORBENTS, PATENT, *PLANT FIBER MATS
1323 " EVAPORATION, EQUIPMENT, EMULSIONS, PATENT, *CONDENSATION
1324 " EMULSIONS, *REVIEW
1325 " ABSORPTION, SORBENTS, PATENT, *URETHANE FOAM
1326 " ABSORPTION, SORBENTS, PATENT, *SORBENT MATS
1343 " OIL DISCHARGES, FRANCE, EQUIPMENT, DETECTION, POLLUTION CONTROL, SKIMMERS, SORBENTS, SINKING AGENTS, PRODUCT INFORMATION
1446 " EQUIPMENT, BILGES, BIBLIOGRAPHIES, BALLAST , SPILL REMOVAL, POLLUTION CONTROL
2163 " MODELS, COALESCENCE, *EVALUATIONS
1233 OIL WELLS, LOUISIANA, LAKES , DOE, BLOWOUTS, SPILL CONTAINMENT, SPILL CLEANUP, USCG, *STRATEGIC PETROLEUM RESERVE
1234 " LOUISIANA, LAKES , DOE, BLOWOUTS, SPILL CLEANUP, USCG, *STRATEGIC PETROLEUM RESERVE
1336 " INLAND, CONTINGENCY PLANNING, ALASKA , US, REGULATIONS, POLLUTION PREVENTION, POLLUTION CONTROL
1441 " OFFSHORE DRILLING, LEGISLATION, EQUIPMENT, ENVIRONMENTAL EFFECTS, BIBLIOGRAPHIES
1390 ONSHORE IMPACTS, OIL-GAS LEASING, OFFSHORE DEVELOPMENT, OCS, ENVIRONMENTAL EFFECTS, EIS, ATLANTIC COAST
1443 " OFFSHORE DEVELOPMENT, OCS, LEGISLATION, INDUSTRIES, BIBLIOGRAPHIES, ALASKA , SOCIOECONOMIC EFFECTS

1413 OXIDATION, MICROORGANISMS, HYDROCARBONS , FUNGI, BIODEGRADATION, BACTERIA, YEASTS, * REVIEW
1416 " HYDROCARBONS , BIODEGRADATION, BACTERIA, *DESULFOVIBRIO DESULFURICANS, *WADDEN SEA
R169 PACIFIC OCEAN, MARINE ORGANISMS, FISH, BIOLOGICAL EFFECTS, BEHAVIOR, *CHEMORECEPTION
1226 PAH, CHEMICAL ANALYSIS, PHYTOPLANKTON, SPECTROMETRY, *FLUORIMETRIC DETERMINATION
1243 " LAKES , SOURCE IDENTIFICATION, SEDIMENTS, GERMANY, *LAKE CONSTANCE
1378 " MEDITERRANEAN SEA, MARINE ORGANISMS, HYDROCARBONS , BIOLOGICAL EFFECTS, SEDIMENTS, TAR, SOURCES, TANKERS
1451 " MASSACHUSETTS, FOSSIL FUELS, BUZZARDS BAY, AROMATIC HYDROCARBONS, SEDIMENTS, SOURCES, *COMBUSTION
R154 " LAKES , GC/MS, CHEMICAL ANALYSIS, *ATMOSPHERIC PETROLEUM RESIDUES
1205 PATENT, OIL DISCHARGES, MONITORING, EQUIPMENT, DETECTION, BALLAST , ANALYTICAL TECHNIQUES, TANKERS
1213 " MONITORING, LEAKAGE, HYDROCARBONS , EQUIPMENT, DETECTION
1214 " OIL TRANSFER, MONITORING, LEAKAGE, DETECTION, PIPELINES
1219 " MONITORING, DESIGN-ENGINEERING, WASTEWATERS, SLUDGE , *LASERS, *OIL FILM
1232 " HYDROCARBONS , DETECTION, ANALYTICAL TECHNIQUES, SPECTROSCOPY, WASTEWATERS
1236 " HYDROCARBONS , CHROMATOGRAPHY, ANALYTICAL TECHNIQUES
1247 " HYDROCARBONS , EQUIPMENT, BOOMS, BEACHES, SPILL CONTAINMENT
1248 " EQUIPMENT, BOOMS, SPILL CONTAINMENT, PLATFORMS
1249 " EQUIPMENT, BOOMS, SPILL CONTAINMENT, POLLUTION CONTROL
1251 " EQUIPMENT, DESIGN-ENGINEERING, PRODUCT INFORMATION, SKIMMERS, SPILL REMOVAL, *SSACV OIL SKIMMER
1258 " EQUIPMENT, DESIGN-ENGINEERING, SPILL REMOVAL
1259 " DISPERSANTS, CRUDE OIL, SPILL REMOVAL, PETROLEUM PRODUCTS
1261 " OIL-WATER SEPARATION, EQUIPMENT, DESIGN-ENGINEERING, SPILL REMOVAL, SKIMMERS, *VACUUMING
1262 " OIL-WATER SEPARATION, EQUIPMENT, DESIGN-ENGINEERING, SPILL REMOVAL, SKIMMERS
1263 " HYDROCARBONS , EQUIPMENT, DESIGN-ENGINEERING, SPILL CLEANUP, SKIMMERS
1264 " OIL-WATER SEPARATION, EQUIPMENT, SPILL REMOVAL, SKIMMERS
1265 " OIL SPILLS, EQUIPMENT, DISPERSION, DESIGN-ENGINEERING, SURFACTANTS
1266 " EQUIPMENT, SPILL CLEANUP, *ULTRASONIC TRANSDUCER
1267 " EMULSIFIERS, DISPERSANTS, SPILL CLEANUP
1270 " MICROORGANISMS, DISPERSANTS, BIODEGRADATION, SPILL CLEANUP
1272 " FRESHWATER, BIODEGRADATION, SEAWATER, SPILL REMOVAL, *P & N COMPOSITIONS
1273 " EQUIPMENT, DESIGN-ENGINEERING, SPILL REMOVAL, *OIL MOP
1275 " OIL SLICKS, INCINERATION, SPILL CLEANUP, *COMBUSTION
1276 " ABSORPTION, SPILL CLEANUP, *MAGNETIC SORBENT POWDER, POLLUTION CONTROL
1278 " LEAKAGE, DETECTION, PIPELINES
1284 " ABSORPTION, WASTEWATER TREATMENT, SORBENTS
1286 " DISPERSION, SLUDGE , PRECIPITATION, FILTRATION
1287 " FLOTATION, EQUIPMENT, WASTEWATER TREATMENT, REFINERIES, *AERATION TURBINE
1288 " BIODEGRADATION, WASTE OIL TREATMENT, *CATALYST
1289 " OIL-WATER SEPARATION, WASTEWATER TREATMENT, *REVERSE OSMOSIS
1293 " WASTEWATER TREATMENT, *FLUIDIZED BEDS
1297 " OIL-WATER SEPARATION, ADSORPTION, WASTEWATER TREATMENT, SORBENTS, *SORBENT FIBERS
1298 " OIL-WATER SEPARATION, ADSORPTION, WASTEWATER TREATMENT, SORBENTS, *SORBENT FIBERS
1299 " ADSORPTION, WASTEWATER TREATMENT, SORBENTS
1300 " ADSORPTION, WASTEWATER TREATMENT, SORBENTS
1303 " OIL-WATER SEPARATION, ADSORPTION, WASTEWATER TREATMENT, SORBENTS, *SORBENT FIBERS
1305 " OIL-WATER SEPARATION, HYDROCARBONS , *PURIFICATION AGENT
1306 " OIL-WATER SEPARATION, EQUIPMENT, *PACKED BEDS
1307 " OIL-WATER SEPARATION, EQUIPMENT, *DISPERSIONS
1308 " OIL-WATER SEPARATION, EQUIPMENT, DESIGN-ENGINEERING, FILTRATION
1309 " OIL-WATER SEPARATION, EQUIPMENT, SPILL CLEANUP
1310 " OIL-WATER SEPARATION, EMULSIONS, COALESCENCE, *SILICONE-COATED FIBERS
1311 " OIL-WATER SEPARATION, ADSORPTION, SORBENTS, *KAPOK FIBERS
1312 " OIL-WATER SEPARATION, EQUIPMENT, EMULSIFIERS, SOLVENTS
1313 " OIL-WATER SEPARATION, EQUIPMENT, DESIGN-ENGINEERING, WASTEWATER TREATMENT
1316 " OIL-WATER SEPARATION, EMULSIONS, ADSORPTION, *SORBENT POWDER
1319 " OIL-WATER SEPARATION, FUEL OIL, WASTEWATER TREATMENT, *SORBENT FIBERS
1320 " OIL-WATER SEPARATION, ABSORPTION, SORBENTS, *PLANT FIBER MATS
1321 " OIL-WATER SEPARATION, EMULSIONS, CRUDE OIL, *DEMULSIFIERS
1322 " OIL-WATER SEPARATION, ABSORPTION, SORBENTS, *PLANT FIBER MATS
1323 " OIL-WATER SEPARATION, EVAPORATION, EQUIPMENT, EMULSIONS, *CONDENSATION
1325 " OIL-WATER SEPARATION, ABSORPTION, SORBENTS, *URETHANE FOAM
1326 " OIL-WATER SEPARATION, ABSORPTION, SORBENTS, *SORBENT MATS
1328 " EVAPORATION, EQUIPMENT, DISTILLATION, WASTE OIL, RECLAMATION, REUSE
1330 " LUBRICATING OIL, WASTE OIL, RECLAMATION, *REGENERATION, *VACUUM STRIPPING
1331 " LUBRICATING OIL, DISTILLATION, RECLAMATION, WASTE OIL, SOLVENTS, *VACUUM STRIPPING
1339 " LEAKAGE, STORAGE, POLLUTION PREVENTION
1342 " EQUIPMENT, DESIGN-ENGINEERING, BLOWOUTS, POLLUTION CONTROL
1345 " LEAKAGE, EQUIPMENT, DETECTION, DESIGN-ENGINEERING, PIPELINES
1332 PERSONNEL TRAINING, MANUALS, IMCO, DISPERSANTS, BOOMS, SKIMMERS, SINKING AGENTS, SORBENTS, SPILL CLEANUP

1333 PERSONNEL TRAINING, OIL INDUSTRY, CONTINGENCY PLANNING, CANADA, POLLUTION CONTROL, *FIELD EXERCISE
1295 PETROCHEMICALS, MODELS, EUROPE, COST ANALYSIS, BIOLOGICAL TREATMENT, WASTEWATERS
1327 " WASTE OIL, WASTEWATERS, REFINERIES, RECLAMATION, REUSE
1440 " INDUSTRIES, ECONOMICS, BIBLIOGRAPHIES, WASTEWATER TREATMENT, REFINERIES, POLLUTION CONTROL
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1259 " PATENT, DISPERSANTS, CRUDE OIL, SPILL REMOVAL
1379 " OCEANS, FOOD WEB, CRUDE OIL, BIOLOGICAL EFFECTS, SOURCES, TOXICITY, PHYTOPLANKTON, *NEKTON
1419 " FATE, EVAPORATION, BEHAVIOR, SOLUBILITY, WSF, *LIGHT REFINED OILS
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1226 PHYTOPLANKTON, PAH, CHEMICAL ANALYSIS, SPECTROMETRY, *FLUORIMETRIC DETERMINATION
1246 " HYDROCARBONS , FRESHWATER, BIOGENIC HYDROCARBONS, BACTERIA, SOURCE IDENTIFICATION, SEAWATER, *REVIEW
1379 " PETROLEUM PRODUCTS, OCEANS, FOOD WEB, CRUDE OIL, BIOLOGICAL EFFECTS, SOURCES, TOXICITY, *NEKTON
1182 PIPELINES, OIL SPILLS, ILLINOIS, EPA, SPILL CLEANUP, RIVERS
1186 " LOUISIANA, LEAKAGE, SPILL CONTAINMENT
1196 " OIL SPILLS, INLAND, INCINERATION, SPILL CONTAINMENT, *UTAH
1197 " INLAND, INCINERATION, SPILL CLEANUP, *UTAH
1214 " PATENT, OIL TRANSFER, MONITORING, LEAKAGE, DETECTION
1278 " PATENT, LEAKAGE, DETECTION
1279 " OIL TRANSFER, LOUISIANA, FEA, CRUDE OIL, STORAGE, *STRATEGIC PETROLEUM RESERVE
1280 " CANADA, PORTS , POLLUTION PREVENTION, WASHINGTON, *PACIFIC COAST, *RISK ANALYSIS, *TRANS-ALASKA PIPELINE
1345 " PATENT, LEAKAGE, EQUIPMENT, DETECTION, DESIGN-ENGINEERING
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1383 " OIL INDUSTRY, OFFSHORE DEVELOPMENT, NORTH SEA, ECONOMIC EFFECTS, *RISK ANALYSIS, SAFETY
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1250 " EQUIPMENT, CANADA, BOOMS, SPILL CONTAINMENT, PRODUCT INFORMATION, US, *FIELD TRIALS
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1333 " PERSONNEL TRAINING, OIL INDUSTRY, CONTINGENCY PLANNING, CANADA, *FIELD EXERCISE
1335 " MONITORING, CONTINGENCY PLANNING, *PERSIAN GULF, *ACTION PLAN
1336 " OIL WELLS, INLAND, CONTINGENCY PLANNING, ALASKA , US, REGULATIONS, POLLUTION PREVENTION
1338 " MEDITERRANEAN SEA, ENVIRONMENTAL PROTECTION, ECONOMICS, *TREATY, *STANDARDS
1341 " MONITORING, MEDITERRANEAN SEA, LEGISLATION, ENVIRONMENTAL MANAGEMENT, UN, *UNEP
1342 " PATENT, EQUIPMENT, DESIGN-ENGINEERING, BLOWOUTS
1343 " OIL-WATER SEPARATION, OIL DISCHARGES, FRANCE, EQUIPMENT, DETECTION, SKIMMERS, SORBENTS, SINKING AGENTS, PRODUCT INFORMATION
1346 " MONITORING, FOREIGN GOVERNMENTS, EUROPE, SURVEILLANCE, UK
1373 " MEDITERRANEAN SEA, ENVIRONMENTAL DETERIORATION, CONTAMINATION, SHORELINES, SOURCES, TAR
1377 " OCEANS, INDUSTRIES, HYDROCARBONS , FRESHWATER, DETECTION, BIOLOGICAL EFFECTS, BIODEGRADATION, SOURCES, WASTEWATERS
1386 " PLATFORMS, OFFSHORE DEVELOPMENT, DESIGN-ENGINEERING, SAFETY, REGULATIONS
1430 " OCEANS, LEGISLATION, HEALTH HAZARDS, FRESHWATER, ENVIRONMENTAL PROTECTION, CONTINGENCY PLANNING, US
1436 " INTERNATIONAL CONVENTIONS, INFORMATION SYSTEMS, EUROPE, COMPENSATION, *EUROPEAN ECONOMIC COMMUNITY
1438 " INTERNATIONAL CONVENTIONS, IMCO, SHIPS, UN
1439 " OFFSHORE DRILLING, OCEANS, LEGISLATION, BIBLIOGRAPHIES
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1255 " EQUIPMENT, DESIGN-ENGINEERING, SPILL CONTAINMENT, SPILL REMOVAL, PRODUCT INFORMATION
1277 " OIL TRANSFER, OIL TERMINALS, OIL DISCHARGES, CRUDE OIL WASHING, BALLAST , TANKERS
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1281 " INCINERATION, SLUDGE , SHIPS, PRODUCT INFORMATION, *EDCO/CITEX SYSTEM

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1372 " MONITORING, ENVIRONMENTAL PROTECTION, BIOLOGICAL EFFECTS, SHIPS, UN, *CONFERENCE, *GESAMP
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1431 " IMCO, GUIDELINES, CRUDE OIL WASHING, SAFETY, TANKERS, SEGREGATED BALLAST, *INERT GAS SYSTEMS, SURVEILLANCE
1432 " GUIDELINES, CONTINGENCY PLANNING, REGULATIONS, SHIPS, SPILL CLEANUP, UK
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1192 " FLORIDA, EPA, SPILL CLEANUP, SOURCE IDENTIFICATION, USCG, *PORT SUTTON SPILL, *CLEANUP COSTS
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1450 " OIL DISCHARGES, NEW YORK, DEVELOPMENT , DEEPWATER PORTS, SAFETY
1286 PRECIPITATION, PATENT, DISPERSION, SLUDGE , FILTRATION
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1207 " MONITORING, HYDROCARBONS , EQUIPMENT, DETECTION, *FLUOROMETRY, *PETRO-TRACT SYSTEM
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1209 " MONITORING, EQUIPMENT, CHROMATOGRAPHY, AROMATIC HYDROCARBONS, *BENZENE
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1217 " MONITORING, EQUIPMENT, ANALYTICAL TECHNIQUES, WASTEWATERS, REFINERIES, *PHOTOMETRIC ANALYZER
1250 " POLLUTION CONTROL, EQUIPMENT, CANADA, BOOMS, SPILL CONTAINMENT, US, *FIELD TRIALS
1251 " PATENT, EQUIPMENT, DESIGN-ENGINEERING, SKIMMERS, SPILL REMOVAL, *SSACV OIL SKIMMER
1252 " IRELAND, EQUIPMENT, DESIGN-ENGINEERING, DEEPWATER PORTS, SKIMMERS, *BAY SKIMMER
1253 " IRELAND, EQUIPMENT, DESIGN-ENGINEERING, SKIMMERS, SPILL CLEANUP, *BANTRY BAY
1254 " EQUIPMENT, DESIGN-ENGINEERING, SPILL REMOVAL, SKIMMERS
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1256 " EQUIPMENT, DESIGN-ENGINEERING, SKIMMERS, SPILL REMOVAL, *DYNAMIC OIL SKIMMER
1257 " EQUIPMENT, EKOFISK BLOWOUT, DESIGN-ENGINEERING, SPILL CLEANUP, SKIMMERS
1269 " EQUIPMENT, SKIMMERS, SAFETY
1271 " OIL DISCHARGES, HYDROCARBONS , FRESHWATER, BIODEGRADATION, BALLAST , BACTERIA, SPILL CLEANUP, SEAWATER
1281 " POLLUTION PREVENTION, INCINERATION, SLUDGE , SHIPS, *EDCO/CITEX SYSTEM
1282 " OIL-WATER SEPARATION, FLOTATION, WASTEWATER TREATMENT, *ASPHALT PLANT, *OHIO RIVER
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1314 " OIL-WATER SEPARATION, EQUIPMENT
1329 " EQUIPMENT, RECLAMATION, SPILL REMOVAL, SKIMMERS
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1328 " PATENT, EVAPORATION, EQUIPMENT, DISTILLATION, WASTE OIL, REUSE
1329 " PRODUCT INFORMATION, EQUIPMENT, SPILL REMOVAL, SKIMMERS
1330 " PATENT, LUBRICATING OIL, WASTE OIL, *REGENERATION, *VACUUM STRIPPING
1331 " PATENT, LUBRICATING OIL, DISTILLATION, WASTE OIL, SOLVENTS, *VACUUM STRIPPING
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1283 " EPA, CONTAMINANTS, API, ANALYTICAL TECHNIQUES, WASTEWATERS, SAMPLING
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1327 " RECLAMATION, PETROCHEMICALS, WASTE OIL, WASTEWATERS, REUSE
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1344 " POLLUTION PREVENTION, INLAND, GOVERNMENT AGENCIES, DRILLING , CONTINGENCY PLANNING, CANADA, BLOWOUT PREVENTION
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1386 " POLLUTION CONTROL, PLATFORMS, OFFSHORE DEVELOPMENT, DESIGN-ENGINEERING, SAFETY
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1433 " OFFSHORE DEVELOPMENT, OCS, GOVERNMENT AGENCIES, ENVIRONMENTAL PROTECTION, SAFETY, USGS
1435 " INTERNATIONAL CONVENTIONS, IMCO, *MARINE POLLUTION CONVENTION
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1269 " PRODUCT INFORMATION, EQUIPMENT, SKIMMERS
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1383 " PLATFORMS, OIL INDUSTRY, OFFSHORE DEVELOPMENT, NORTH SEA, ECONOMIC EFFECTS, *RISK ANALYSIS
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1448 " CONTAMINANTS, CHEMICAL ANALYSIS, BOOK REVIEW
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1187 " RIVERS, NEW YORK, SPILL CLEANUP, USCG, *HYGRADE NO. 2 BARGE SPILL
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1353 " OIL SPILLS, INVERTEBRATES, CHILE, BIOLOGICAL EFFECTS, BEACHES, *NORTHERN BREEZE SPILL
1373 " POLLUTION CONTROL, MEDITERRANEAN SEA, ENVIRONMENTAL DETERIORATION, CONTAMINATION, SOURCES, TAR

1404 " SEDIMENTATION, OIL SPILLS, FATE, ECOSYSTEMS, BASELINE STUDIES, ALASKA , *VULNERABILITY INDEX, *LOWER COOK INLET
1405 SHORELINES, SEDIMENTATION, OIL SPILLS, FATE, ECOSYSTEMS, BASELINE STUDIES, ALASKA , *VULNERABILITY INDEX, *LOWER COOK INLET
1408 " SEDIMENTATION, OIL SPILLS, GULF OF ALASKA, ECOSYSTEMS, BASELINE STUDIES, *VULNERABILITY INDEX
1332 SINKING AGENTS, PERSONNEL TRAINING, MANUALS, IMCO, DISPERSANTS, BOOMS, SKIMMERS, SORBENTS, SPILL CLEANUP
1343 " PRODUCT INFORMATION, POLLUTION CONTROL, OIL-WATER SEPARATION, OIL DISCHARGES, FRANCE, EQUIPMENT, DETECTION, SKIMMERS, SORBENTS
1251 SKIMMERS, PRODUCT INFORMATION, PATENT, EQUIPMENT, DESIGN-ENGINEERING, SPILL REMOVAL, *SSACV OIL SKIMMER
1252 " PRODUCT INFORMATION, IRELAND, EQUIPMENT, DESIGN-ENGINEERING, DEEPWATER PORTS, *BAY SKIMMER
1253 " PRODUCT INFORMATION, IRELAND, EQUIPMENT, DESIGN-ENGINEERING, SPILL CLEANUP, *BANTRY BAY
1254 " PRODUCT INFORMATION, EQUIPMENT, DESIGN-ENGINEERING, SPILL REMOVAL
1256 " PRODUCT INFORMATION, EQUIPMENT, DESIGN-ENGINEERING, SPILL REMOVAL, *DYNAMIC OIL SKIMMER
1257 " PRODUCT INFORMATION, EQUIPMENT, EKOFISK BLOWOUT, DESIGN-ENGINEERING, SPILL CLEANUP
1261 " PATENT, OIL-WATER SEPARATION, EQUIPMENT, DESIGN-ENGINEERING, SPILL REMOVAL, *VACUUMING
1262 " PATENT, OIL-WATER SEPARATION, EQUIPMENT, DESIGN-ENGINEERING, SPILL REMOVAL
1263 " PATENT, HYDROCARBONS , EQUIPMENT, DESIGN-ENGINEERING, SPILL CLEANUP
1264 " PATENT, OIL-WATER SEPARATION, EQUIPMENT, SPILL REMOVAL
1268 " IRELAND, GOVERNMENT AGENCIES, DISPERSANTS, CONTINGENCY PLANNING, COASTS, BOOMS, SPILL CLEANUP, TANKERS
1269 " SAFETY, PRODUCT INFORMATION, EQUIPMENT
1329 " RECLAMATION, PRODUCT INFORMATION, EQUIPMENT, SPILL REMOVAL
1332 " SINKING AGENTS, PERSONNEL TRAINING, MANUALS, IMCO, DISPERSANTS, BOOMS, SORBENTS, SPILL CLEANUP
1343 " SINKING AGENTS, PRODUCT INFORMATION, POLLUTION CONTROL, OIL-WATER SEPARATION, OIL DISCHARGES, FRANCE, EQUIPMENT, DETECTION, SORBENTS
1219 SLUDGE , PATENT, MONITORING, DESIGN-ENGINEERING, WASTEWATERS, *LASERS, *OIL FILM
1281 " SHIPS, PRODUCT INFORMATION, POLLUTION PREVENTION, INCINERATION, *EDCO/CITEX SYSTEM
1286 " PRECIPITATION, PATENT, DISPERSION, FILTRATION
1368 SOCIAL EFFECTS, ENVIRONMENTAL EFFECTS, ECONOMICS, ARCTIC, SPILL CLEANUP, *REMOTE REGIONS
1389 SOCIOECONOMIC EFFECTS, OIL-GAS LEASING, OCS, ENVIRONMENTAL EFFECTS, EIS, ATLANTIC COAST
1443 " ONSHORE IMPACTS, OFFSHORE DEVELOPMENT, OCS, LEGISLATION, INDUSTRIES, BIBLIOGRAPHIES, ALASKA
1296 SOIL, ENVIRONMENTAL EFFECTS, DISPOSAL , DESIGN-ENGINEERING, WASTE OIL, VEGETATION, *LAND APPLICATION
1229 SOLUBILITY, HYDROCARBONS , CHEMICAL ANALYSIS, AROMATIC HYDROCARBONS, SURFACTANTS
1360 " POLYCHAETES, BIOASSAY, AROMATIC HYDROCARBONS, TOXICITY, *PNA, *NEANTHES ARENACEODENTATA
1419 " PETROLEUM PRODUCTS, FATE, EVAPORATION, BEHAVIOR, WSF, *LIGHT REFINED OILS
5156 " FOSSIL FUELS, CONTAMINANTS, CHEMICAL ANALYSIS, ANALYTICAL TECHNIQUES, SOURCE IDENTIFICATION, *ORGANIC COMPOUNDS
1312 SOLVENTS, PATENT, OIL-WATER SEPARATION, EQUIPMENT, EMULSIFIERS
1331 " RECLAMATION, PATENT, LUBRICATING OIL, DISTILLATION, WASTE OIL, *VACUUM STRIPPING
1215 SORBENTS, OCEANS, MONITORING, DETECTION, CONTAMINANTS
1284 " PATENT, ABSORPTION, WASTEWATER TREATMENT
1297 " PATENT, OIL-WATER SEPARATION, ADSORPTION, WASTEWATER TREATMENT, *SORBENT FIBERS
1298 " PATENT, OIL-WATER SEPARATION, ADSORPTION, WASTEWATER TREATMENT, *SORBENT FIBERS
1299 " PATENT, ADSORPTION, WASTEWATER TREATMENT
1300 " PATENT, ADSORPTION, WASTEWATER TREATMENT
1303 " PATENT, OIL-WATER SEPARATION, ADSORPTION, WASTEWATER TREATMENT, *SORBENT FIBERS
1311 " PATENT, OIL-WATER SEPARATION, ADSORPTION, *KAPOK FIBERS
1320 " PATENT, OIL-WATER SEPARATION, ABSORPTION, *PLANT FIBER MATS
1322 " PATENT, OIL-WATER SEPARATION, ABSORPTION, *PLANT FIBER MATS
1325 " PATENT, OIL-WATER SEPARATION, ABSORPTION, *URETHANE FOAM
1326 " PATENT, OIL-WATER SEPARATION, ABSORPTION, *SORBENT MATS
1332 " SKIMMERS, SINKING AGENTS, PERSONNEL TRAINING, MANUALS, IMCO, DISPERSANTS, BOOMS, SPILL CLEANUP
1343 " SKIMMERS, SINKING AGENTS, PRODUCT INFORMATION, POLLUTION CONTROL, OIL-WATER SEPARATION, OIL DISCHARGES, FRANCE, EQUIPMENT, DETECTION
1192 SOURCE IDENTIFICATION, PORTS , FLORIDA, EPA, SPILL CLEANUP, USCG, *PORT SUTTON SPILL, *CLEANUP COSTS
1193 " LIABILITY, LAW ENFORCEMENT, FLORIDA, USCG, *PORT SUTTON SPILL, *CLEANUP COSTS
1194 " SAMPLING, LIABILITY, LAW ENFORCEMENT, FLORIDA, USCG, TANKERS, *PORT SUTTON SPILL
1202 " COASTS, CHESAPEAKE BAY, BEACH CLEANUP, TAR, USCG
1213 " MONITORING, INFORMATION SYSTEMS, CONTAMINANTS, *NATIONAL WATER DATA EXCHANGE
1221 " REMOTE SENSING, POLLUTION CONTROL, OIL SLICKS, MONITORING, EPA, ANALYTICAL TECHNIQUES, *LASER FLUORESCENCE

1225 SOURCE IDENTIFICATION, OIL SPILLS, GC/MS, CRUDE OIL, ANALYTICAL TECHNIQUES
1242 " CHROMATOGRAPHY, ANALYTICAL TECHNIQUES, SPECTROSCOPY, *FLUORESCENCE, *IR ANALYSIS
1243 " SEDIMENTS, PAH, LAKES , GERMANY, *LAKE CONSTANCE
1244 " FUEL OIL, CRUDE OIL, CHROMATOGRAPHY, CHEMICAL ANALYSIS, TAR, *HIGH SPEED GEL PERMEATION METHOD
1245 " PETROLEUM PRODUCTS, MODELS, FUEL OIL, DETECTION, SPECTROMETRY, STATISTICAL ANALYSIS
1246 " SEAWATER, PHYTOPLANKTON, HYDROCARBONS , FRESHWATER, BIOGENIC HYDROCARBONS, BACTERIA, *REVIEW
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1190 SOURCES, OIL SLICKS, MOVEMENT, BEACHES, *TRINIDAD
1228 " SEDIMENTS, OFFSHORE DRILLING, HYDROCARBONS , CONTAMINATION, BIOGENIC HYDROCARBONS, ATLANTIC COAST, *NOVA SCOTIA
1359 " MORTALITY, HYDROCARBONS , FATE, CONTAMINATION, BIRDS, TOXICITY, SURFACTANTS, *REVIEW
1373 " SHORELINES, POLLUTION CONTROL, MEDITERRANEAN SEA, ENVIRONMENTAL DETERIORATION, CONTAMINATION, TAR
1377 " POLLUTION CONTROL, OCEANS, INDUSTRIES, HYDROCARBONS , FRESHWATER, DETECTION, BIOLOGICAL EFFECTS, BIODEGRADATION, WASTEWATERS
1378 " SEDIMENTS, PAH, MEDITERRANEAN SEA, MARINE ORGANISMS, HYDROCARBONS , BIOLOGICAL EFFECTS, TAR, TANKERS
1379 " PHYTOPLANKTON, PETROLEUM PRODUCTS, OCEANS, FOOD WEB, CRUDE OIL, BIOLOGICAL EFFECTS, TOXICITY, *BENTON
1384 " REGULATIONS, OFFSHORE DEVELOPMENT, OCEANS, MONITORING, ENVIRONMENTAL MANAGEMENT, DRILLING , BIOLOGICAL EFFECTS
1411 " OIL SPILLS, OIL DISCHARGES, MICROORGANISMS, EMULSIFICATION, BIODEGRADATION, BEHAVIOR, SPILL CLEANUP, *REVIEW
1422 " SEDIMENTATION, RIVERS, LAKES , HYDROCARBONS , WASHINGTON, *RUNOFF
1451 " SEDIMENTS, PAH, MASSACHUSETTS, FOSSIL FUELS, BUZZARDS BAY, AROMATIC HYDROCARBONS, *COMBUSTION
R195 " SEDIMENTATION, OCS, HYDROCARBONS , FATE, ALASKA , *NORTON SOUND
1226 SPECTROMETRY, PHYTOPLANKTON, PAH, CHEMICAL ANALYSIS, *FLUORIMETRIC DETERMINATION
1235 " HYDROCARBONS , CHROMATOGRAPHY, CHEMICAL ANALYSIS, *IR ANALYSIS
1238 " CHROMATOGRAPHY, ANALYTICAL TECHNIQUES, *IR ANALYSIS
1245 " SOURCE IDENTIFICATION, PETROLEUM PRODUCTS, MODELS, FUEL OIL, DETECTION, STATISTICAL ANALYSIS
R194 " SEDIMENTATION, HYDROCARBONS , FATE, CHROMATOGRAPHY, BERMUDA
1224 SPECTROSCOPY, CHROMATOGRAPHY, ANALYTICAL TECHNIQUES, *CASE HISTORIES
1232 " PATENT, HYDROCARBONS , DETECTION, ANALYTICAL TECHNIQUES, WASTEWATERS
1234 " SAMPLING, CHROMATOGRAPHY, ANALYTICAL TECHNIQUES, STATISTICS
1242 " SOURCE IDENTIFICATION, CHROMATOGRAPHY, ANALYTICAL TECHNIQUES, *FLUORESCENCE, *IR ANALYSIS
1175 SPILL CLEANUP, OIL TRANSFER, OIL TERMINALS, TANKERS, UK, *AMLWCH SPILL
1176 " SHORELINES, OIL SLICKS, DISPERSANTS, BEACH CLEANUP, UK, *AMLWCH SPILL
1182 " RIVERS, PIPELINES, OIL SPILLS, ILLINOIS, EPA
1183 " OIL SPILLS, GOVERNMENT AGENCIES, ENGLAND, COASTS, *ELENI V
1184 " SHIPS, OIL DISCHARGES, LEAKAGE, IRELAND, ENVIRONMENTAL EFFECTS, CONTAMINATION
1187 " SHIPS, RIVERS, NEW YORK, USCG, *HYGRADE NO. 2 BARGE SPILL
1189 " NEW YORK, LEAKAGE, DETECTION, USCG
1191 " PORTS , INTERTIDAL ZONE, FLORIDA, ENVIRONMENTAL EFFECTS, BAYS, USCG, *PORT SUTTON SPILL
1192 " SOURCE IDENTIFICATION, PORTS , FLORIDA, EPA, USCG, *PORT SUTTON SPILL, *CLEANUP COSTS
1197 " PIPELINES, INLAND, INCINERATION, *UTAH
1199 " HARBORS, DISPERSANTS, TANKERS, *SOUTH AFRICA , *STAWANDA SPILL
1200 " OIL SPILLS, MISSISSIPPI RIVER, LOUISIANA, TANKERS, USCG, *IRENE S. LEMOS SPILL
1203 " OIL WELLS, LOUISIANA, LAKES , DOE, BLOWOUTS, SPILL CONTAINMENT, USCG, *STRATEGIC PETROLEUM RESERVE
1204 " OIL WELLS, LOUISIANA, LAKES , DOE, BLOWOUTS, USCG, *STRATEGIC PETROLEUM RESERVE
1253 " SKIMMERS, PRODUCT INFORMATION, IRELAND, EQUIPMENT, DESIGN-ENGINEERING, *BANTRY BAY
1257 " SKIMMERS, PRODUCT INFORMATION, EQUIPMENT, EKOFISK BLOWOUT, DESIGN-ENGINEERING
1260 " OIL SLICKS, ENVIRONMENTAL EFFECTS, DISPERSANTS, BEACH CLEANUP, ANALYTICAL TECHNIQUES, TOXICITY, *LICENSING, UK
1263 " SKIMMERS, PATENT, HYDROCARBONS , EQUIPMENT, DESIGN-ENGINEERING
1266 " PATENT, EQUIPMENT, *ULTRASONIC TRANSDUCER
1267 " PATENT, EMULSIFIERS, DISPERSANTS
1268 " SKIMMERS, IRELAND, GOVERNMENT AGENCIES, DISPERSANTS, CONTINGENCY PLANNING, COASTS, BOOMS, TANKERS
1270 " PATENT, MICROORGANISMS, DISPERSANTS, BIODEGRADATION
1271 " SEAWATER, PRODUCT INFORMATION, OIL DISCHARGES, HYDROCARBONS , FRESHWATER, BIODEGRADATION, BALLAST , BACTERIA
1274 " ICE, FUEL OIL, FATE, BUZZARDS BAY, BOUCHARD 65 SPILL, BEHAVIOR
1275 " PATENT, OIL SLICKS, INCINERATION, *COMBUSTION

1276 SPILL CLEANUP, POLLUTION CONTROL, PATENT, ABSORPTION, *MAGNETIC SORBENT POWDER
1309 " PATENT, OIL-WATER SEPARATION, EQUIPMENT
1332 " SORBENTS, SKIMMERS, SINKING AGENTS, PERSONNEL TRAINING, MANUALS, IMCO, DISPERSANTS, BOOMS
1334 " POLLUTION PREVENTION, GOVERNMENT AGENCIES, ENGLAND, CONTINGENCY PLANNING
1368 " SOCIAL EFFECTS, ENVIRONMENTAL EFFECTS, ECONOMICS, ARCTIC, *REMOTE REGIONS
1387 " POLLUTION PREVENTION, GULF OF MEXICO, DEEPWATER PORTS, COMPENSATION, *LOOP, *SEADOCK
1410 " MICROORGANISMS, HYDROCARBONS , BIODEGRADATION
1411 " SOURCES, OIL SPILLS, OIL DISCHARGES, MICROORGANISMS, EMULSIFICATION, BIODEGRADATION, BEHAVIOR, *REVIEW
1414 " MICROORGANISMS, BIODEGRADATION, *FERTILIZER, *NITROGEN, *PHOSPHORUS
1427 " INCINERATION, ICE, FATE, ESTUARIES, DISPERSANTS, BEHAVIOR, ARCTIC, *EXPERIMENTAL OIL SPILLS
1432 " SHIPS, REGULATIONS, POLLUTION PREVENTION, GUIDELINES, CONTINGENCY PLANNING, UK
R158 " HYDROCARBONS , BIODEGRADATION, SURFACTANTS, WASTEWATER TREATMENT, *SOLUBILIZATION
R159 " HYDROCARBONS , ABSORPTION, *STARCH POLYMERS
1185 SPILL CONTAINMENT, OIL TRANSFER, OIL SPILLS, LEAKAGE, JAPAN, TANKERS, *RYUYO MARU SPILL
1186 " PIPELINES, LOUISIANA, LEAKAGE
1196 " PIPELINES, OIL SPILLS, INLAND, INCINERATION, *UTAH
1203 " SPILL CLEANUP, OIL WELLS, LOUISIANA, LAKES , DOE, BLOWOUTS, USCG, *STRATEGIC PETROLEUM RESERVE
1247 " PATENT, HYDROCARBONS , EQUIPMENT, BOOMS, BEACHES
1248 " PLATFORMS, PATENT, EQUIPMENT, BOOMS
1249 " POLLUTION CONTROL, PATENT, EQUIPMENT, BOOMS
1250 " PRODUCT INFORMATION, POLLUTION CONTROL, EQUIPMENT, CANADA, BOOMS, US, *FIELD TRIALS
1255 " PRODUCT INFORMATION, POLLUTION PREVENTION, EQUIPMENT, DESIGN-ENGINEERING, SPILL REMOVAL
1251 SPILL REMOVAL, SKIMMERS, PRODUCT INFORMATION, PATENT, EQUIPMENT, DESIGN-ENGINEERING, *SSACV OIL SKIMMER
1254 " SKIMMERS, PRODUCT INFORMATION, EQUIPMENT, DESIGN-ENGINEERING
1255 " SPILL CONTAINMENT, PRODUCT INFORMATION, POLLUTION PREVENTION, EQUIPMENT, DESIGN-ENGINEERING
1256 " SKIMMERS, PRODUCT INFORMATION, EQUIPMENT, DESIGN-ENGINEERING, *DYNAMIC OIL SKIMMER
1258 " PATENT, EQUIPMENT, DESIGN-ENGINEERING
1259 " PETROLEUM PRODUCTS, PATENT, DISPERSANTS, CRUDE OIL
1261 " SKIMMERS, PATENT, OIL-WATER SEPARATION, EQUIPMENT, DESIGN-ENGINEERING, *VACUUMING
1262 " SKIMMERS, PATENT, OIL-WATER SEPARATION, EQUIPMENT, DESIGN-ENGINEERING
1264 " SKIMMERS, PATENT, OIL-WATER SEPARATION, EQUIPMENT
1272 " SEAWATER, PATENT, FRESHWATER, BIODEGRADATION, *P & N COMPOSITIONS
1273 " PATENT, EQUIPMENT, DESIGN-ENGINEERING, *OIL MOP
1329 " SKIMMERS, RECLAMATION, PRODUCT INFORMATION, EQUIPMENT
1446 " POLLUTION CONTROL, OIL-WATER SEPARATION, EQUIPMENT, BILGES, BIBLIOGRAPHIES, BALLAST
1366 SPREADING, EVAPORATION, BEHAVIOR, *OIL FILM
1367 " OIL SLICKS, FATE, DRIFT
1428 " OIL SLICKS, MODELS, FATE, DISTRIBUTION, BEHAVIOR, *PREDICTION
1198 STATISTICAL ANALYSIS, SAFETY, POLLUTION PREVENTION, INFORMATION SYSTEMS, TANKERS, *RISK ANALYSIS, *MARINE MANAGEMENT SYSTEMS, INC.
1245 " SPECTROMETRY, SOURCE IDENTIFICATION, PETROLEUM PRODUCTS, MODELS, FUEL OIL, DETECTION
R198 " MODELS, EMULSIONS, BEHAVIOR, *OIL-SURFACTANT-WATER SYSTEMS
1234 STATISTICS, SPECTROSCOPY, SAMPLING, CHROMATOGRAPHY, ANALYTICAL TECHNIQUES
1423 " SAFETY, OFFSHORE DEVELOPMENT, INDUSTRIES, *RISK ANALYSIS
1279 STORAGE, PIPELINES, OIL TRANSFER, LOUISIANA, FEA, CRUDE OIL, *STRATEGIC PETROLEUM RESERVE
1339 " POLLUTION PREVENTION, PATENT, LEAKAGE
1394 " ENVIRONMENTAL EFFECTS, EIS, CRUDE OIL, *STRATEGIC PETROLEUM RESERVE
1395 " LOUISIANA, ENVIRONMENTAL EFFECTS, EIS, CRUDE OIL, *STRATEGIC PETROLEUM RESERVE
1396 " LOUISIANA, ENVIRONMENTAL EFFECTS, EIS, CRUDE OIL, *STRATEGIC PETROLEUM RESERVE
1397 " LOUISIANA, ENVIRONMENTAL EFFECTS, EIS, CRUDE OIL, *STRATEGIC PETROLEUM RESERVE
1398 " OIL TRANSPORT, OIL SPILLS, EIS, *STRATEGIC PETROLEUM RESERVE
1399 " ENVIRONMENTAL EFFECTS, EIS, *STRATEGIC PETROLEUM RESERVE
1400 " OIL SPILLS, EIS, *BRINE SPILLS, *RISK ANALYSIS, *STRATEGIC PETROLEUM RESERVE
1401 " ENVIRONMENTAL EFFECTS, EIS, *STRATEGIC PETROLEUM RESERVE
1402 " OIL TRANSPORT, OIL TERMINALS, OIL SPILLS, EIS, *RISK ANALYSIS, *STRATEGIC PETROLEUM RESERVE
1403 " OIL SPILLS, ENVIRONMENTAL EFFECTS, EIS, *RISK ANALYSIS, *STRATEGIC PETROLEUM RESERVE
1351 SUBLETHAL EFFECTS, METABOLISM, FISH, EMULSIONS, DISPERSANTS, CRUDE OIL, TOXICITY, WEATHERING
1356 " MORTALITY, HABITATS, CONTAMINATION, BIRDS, ACUTE EFFECTS, *WATERFOWL
R165 " MODELS, MARINE ORGANISMS, FUEL OIL, BEHAVIOR, *HEAT, *CHEMORECEPTION
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1229 SURFACTANTS, SOLUBILITY, HYDROCARBONS , CHEMICAL ANALYSIS, AROMATIC HYDROCARBONS
1241 " SEAWATER, MEDITERRANEAN SEA, CONTAMINANTS, ANALYTICAL TECHNIQUES, SOURCE INDENTIFICATION, *ELECTROANALYSIS
1265 " PATENT, OIL SPILLS, EQUIPMENT, DISPERSION, DESIGN-ENGINEERING
1359 " SOURCES, MORTALITY, HYDROCARBONS , FATE, CONTAMINATION, BIRDS, TOXICITY, *REVIEW
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R160 " ENVIRONMENTAL PROTECTION, DISPERSANTS, BEACH CLEANUP, *SURFACE TREATMENT AGENTS, *FIELD TESTS
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1220 " REMOTE SENSING, OIL SPILLS, FRANCE, EQUIPMENT
1346 " POLLUTION CONTROL, MONITORING, FOREIGN GOVERNMENTS, EUROPE, UK
1431 " SEGREGATED BALLAST, SAFETY, POLLUTION PREVENTION, IMCO, GUIDELINES, CRUDE OIL WASHING, TANKERS, *INERT GAS SYSTEMS
1201 SWEDEN, ENVIRONMENTAL EFFECTS, COASTS, BIRDS, TAR
1175 TANKERS, SPILL CLEANUP, OIL TRANSFER, OIL TERMINALS, UK, *AMLWCH SPILL
1178 " SURVEILLANCE, SAFETY, ENGLISH CHANNEL, *TRAFFIC CONTROL
1179 " OIL TRANSFER, OIL SPILLS, DISPERSANTS, UK, *CHRISTOS BITAS SPILL
1180 " OIL TRANSFER, OIL SPILLS, ENVIRONMENTAL EFFECTS, BIRDS, UK, *CHRISTOS BITAS SPILL, *SALVAGE OPERATIONS
1181 " SHORELINES, OIL SPILLS, OIL SLICKS, UK, *CHRISTOS BITAS SPILL
1185 " SPILL CONTAINMENT, OIL TRANSFER, OIL SPILLS, LEAKAGE, JAPAN, *RYUYO MARU SPILL
1194 " SOURCE IDENTIFICATION, SAMPLING, LIABILITY, LAW ENFORCEMENT, FLORIDA, USCG, *PORT SUTTON SPILL
1198 " STATISTICAL ANALYSIS, SAFETY, POLLUTION PREVENTION, INFORMATION SYSTEMS, *RISK ANALYSIS, *MARINE MANAGEMENT SYSTEMS, INC.
1199 " SPILL CLEANUP, HARBORS, DISPERSANTS, *SOUTH AFRICA , *STANANDA SPILL
1200 " SPILL CLEANUP, OIL SPILLS, MISSISSIPPI RIVER, LOUISIANA, USCG, *IRENE S. LEMOS SPILL
1205 " PATENT, OIL DISCHARGES, MONITORING, EQUIPMENT, DETECTION, BALLAST , ANALYTICAL TECHNIQUES
1268 " SPILL CLEANUP, SKIMMERS, IRELAND, GOVERNMENT AGENCIES, DISPERSANTS, CONTINGENCY PLANNING, COASTS, BOOMS
1277 " POLLUTION PREVENTION, OIL TRANSFER, OIL TERMINALS, OIL DISCHARGES, CRUDE OIL WASHING, BALLAST
1340 " SAFETY, REGULATIONS, POLLUTION PREVENTION, INTERNATIONAL CONVENTIONS, INTERNATIONAL AGREEMENTS
1378 " SOURCES, SEDIMENTS, PAH, MEDITERRANEAN SEA, MARINE ORGANISMS, HYDROCARBONS , BIOLOGICAL EFFECTS, TAR
1382 " OIL SPILLS, OIL INDUSTRY, INSURANCE, ECONOMIC EFFECTS, DEVELOPMENT , *CLAIMS
1409 " HYDROCARBONS , BIOLOGICAL EFFECTS, BASELINE STUDIES, BALLAST , ALASKA , *TRANS-ALASKA PIPELINE, *PORT VALDEZ
1431 " SURVEILLANCE, SEGREGATED BALLAST, SAFETY, POLLUTION PREVENTION, IMCO, GUIDELINES, CRUDE OIL WASHING, *INERT GAS SYSTEMS
1201 TAR, SWEDEN, ENVIRONMENTAL EFFECTS, COASTS, BIRDS
1202 " SOURCE IDENTIFICATION, COASTS, CHESAPEAKE BAY, BEACH CLEANUP, USCG
1244 " SOURCE IDENTIFICATION, FUEL OIL, CRUDE OIL, CHROMATOGRAPHY, CHEMICAL ANALYSIS, *HIGH SPEED GEL PERMEATION METHOD
1373 " SOURCES, SHORELINES, POLLUTION CONTROL, MEDITERRANEAN SEA, ENVIRONMENTAL DETERIORATION, CONTAMINATION
1378 " TANKERS, SOURCES, SEDIMENTS, PAH, MEDITERRANEAN SEA, MARINE ORGANISMS, HYDROCARBONS , BIOLOGICAL EFFECTS
1418 " NATURAL SEEPAGE, HYDROCARBONS , CHROMATOGRAPHY, BIODEGRADATION, *HYPERSALINE ENVIRONMENTS
1381 TEXAS, SEDIMENTS, HYDROCARBONS , GULF OF MEXICO, ENVIRONMENTAL EFFECTS, CHEMICAL ANALYSIS, BLOWOUTS
1260 TOXICITY, SPILL CLEANUP, OIL SLICKS, ENVIRONMENTAL EFFECTS, DISPERSANTS, BEACH CLEANUP, ANALYTICAL TECHNIQUES, *LICENSING, UK
1347 " OIL SPILLS, HYDROCARBONS , ESTUARIES, *PHOTO-OXIDATION
1348 " REPRODUCTION, FISH, CRUDE OIL, BIOLOGICAL EFFECTS, *RAINBOW TROUT
1350 " FUEL OIL, CRUDE OIL, BIRDS, BIOLOGICAL EFFECTS, *HATCHABILITY, *INCUBATION STAGES
1351 " SUBLETHAL EFFECTS, METABOLISM, FISH, EMULSIONS, DISPERSANTS, CRUDE OIL, WEATHERING
1352 " CRUDE OIL, BACTERIA, WSF, *REFINED OILS, *WEATHERED OILS
1354 " FISH, BIOLOGICAL EFFECTS, AROMATIC HYDROCARBONS, UPTAKE, *NAPHTHALENE, *FUNDULUS HETEROCLITUS
1359 " SURFACTANTS, SOURCES, MORTALITY, HYDROCARBONS , FATE, CONTAMINATION, BIRDS, *REVIEW
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APPENDIX A

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Analytical Chemistry
Applied Ecology Abstracts
Applied Energy
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Aquatic Sciences & Fisheries Abstracts
Audubon
Australian Science Index
Berichte der Deutschen Wissenschaftlichen Komission fuer Meeresforschung
Bibliography and Index of Geology
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Bulletin of Environmental Contamination and Toxicology
Bulletin of Marine Science
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Chemical Engineering Progress
Chemical Week
Chemistry in Canada
Chemosphere
Coastal Engineering
Coastal Zone Management Journal
Conservation News
Current Contents: Life Sciences
Current Contents: Physical and Chemical Sciences
Deep-Sea Research/Oceanographic Bibliography
Ecolibrium
Ecological Abstracts
Ecological Modelling
The Ecologist
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Energy Information Abstracts
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APPENDIX B
OIL POLLUTION REPORTS
(Formerly OIL SPILL AND OIL POLLUTION REPORTS, 1974 - Vol. 5 No. 1)

REPORT PERIOD	PUBLICATION DATE	EPA ACCESSION NUMBER	NTIS ACCESSION NUMBER	PRICE PER COPY*
Jul 74-Oct 74	Mar 1975	EPA 670/2-75-003	PB 240-719	9.25
Nov 74-Feb 75	May 1975	EPA 670/2-75-044	PB 242-542	10.75
Feb 75-Apr 75	Jun 1975	EPA 670/2-75-059	PB 243-724	9.50
May 75-Jul 75	Jul 1976	EPA 600/2-76-129	PB 258-852	12.00
Aug 75-Oct 75	Jul 1976	EPA 600/2-76-113	PB 258-745	11.75
Nov 75-Jan 76	Jul 1976	EPA 600/2-76-185	PB 257-886	12.50
Feb 76-Apr 76	Aug 1976	EPA 600-2-76-215	PB 259-932	11.75
May 76-Jul 76	Oct 1976	EPA 600/2-76-266	PB 264-870	12.50
Aug 76-Oct 76	Feb 1977	EPA 600/2-77-037	PB 267-266	11.75
Nov 76-Jan 77	Apr 1977	EPA 600/2-77-075	PB 268-248	11.75
Feb 77-Apr 77	Jun 1977	EPA 600/2-77-111	PB 272-689	12.50
May 77-Jul 77	Nov 1977	EPA 600/2-77-243	PB 276-691	13.00
Aug 77-Oct 77	Jan 1978	EPA 600/2-78-005	PB 281-114	11.00
Vol 5 No. 1 (Nov 77-Jan 78)	Apr 1978	EPA 600/2-78-071	PB 281-671	9.25
Vol. 5 No. 2 (Feb 78-May 78)	Aug 1978	EPA 600/7-78-160	PB 287-071	10.75
Vol. 5 No. 3 (Jun-Sep 78)	________	Submitted 10/78	PB**	**
Vol. 5 No. 4 (Oct-Dec 78)	________	Submitted 1/79	PB**	**

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